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Architectural Quicksands

By Clinton H. Blake, Jr., of the New York and Federal Bars
With an Introduction by Daniel Paul Higgins

UNDER the heading of "The Business of Architecture," articles have appeared in the September, October, November and December, 1916; January, February and March, 1918, issues of "The Architectural Review" by the writer, and continued by Professor H. D. Smith under the same heading and in the same journal in May, June, July and August, 1918, and beginning again in June, 1920, issue, as well as articles by the writer in THE AMERICAN ARCHITECT under the heading "Architect's Office Organization to Meet Post-War Conditions."

These early articles have analyzed and charted the various forms of important architect's organizations as they actually exist with many pertinent remarks and criticisms concerning same and in the final analysis have presented an ideal and practical organization based upon the conception that the most comprehensive organization can be built up with a series of units effecting special and technical training. The corollary of this proposition is that the function of the proper business administration is to maintain a balance among other units rather than to attempt the arbitrary control and administration of each unit. The trend of this administration is toward centralization, and is a system of checks and balances that centralization does not carry to the extent of devitalizing the other units such as design, engineering, supervision and decoration. The aggregation of these units will result in a unit sufficiently complete within itself for all practical purposes balancing a number of highly specialized functions to produce a homogeneous economical result.

In the previous review of the ideal organization and to complete the system of checks and balances it is pointed out that an architect with an important practice should have the legal guidance of a lawyer skilled in the law of architecture and building so that he may protect and understand the rights and obligations of himself and of his clients, thereby reaping the benefits accorded by this law and avoiding the penalties provided for a breach of it.

An architect who exercises the duties and responsibilities of contracting for work and assumes the responsibilities for the execution of same as the owner's agent without the knowledge of the first principles of the law of contracts and in the absence of the proper legal advice and surveillance is not diligently or honestly acting for his client's best interest. Apart from his duties and obligations to his client, in this respect, self interest should induce the intelligent architect to understand his own rights and obligations.

For further amplification of the legal problem and complication which the modern architect has to face in the course of his practice and in order that he may clearly grasp the significance of the importance of attention to this part of his practice THE AMERICAN ARCHITECT has with good judgment secured the services of Mr. Clinton H. Blake, Jr., whose experience and familiarity with the law affecting Architecture and Building equip him to give an authoritative review of mistakes commonly made by architects of his acquaintance and to present essential remedies for such errors.

Mr. Blake, who is the author of the text book and writings on "The Law of Architect, Owner and Contractor" and "The Law of Architecture and Building," is a graduate of Columbia College 1904, Master of Arts, Columbia University (School of Political Science) 1905, and a graduate of Columbia Law School in the class 1906. Mr. Blake was admitted to the New York Bar in 1906 and in taking his degree of Master of Arts specialized in constitutional and administrative law. He has always taken a keen interest in architecture, and in addition to his general practice has specialized in the laws affecting Architecture and Building. He has made a special study of these laws—both the New York and Federal laws and the laws of other countries—and has won much recognition by his practical presentation of the subjects in his

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writings. In practice he has shown rare ability in the application of the principles affecting the above subjects, and in his handling of cases affecting the mutual rights of architect, owner and contractor.

In 1908 Mr. Blake became a member of the firm of Strong, Blake & McAneny and has continued as a member of that firm and its successors, the firm name now being Blake, McAneny, Durham & DiMilhau. The firm has a general practice in the New York and Federal Courts with specialization in Architectural and Building Law, and in the law of estates and corporations.

DANIEL PAUL HIGGINS

The Business Side of Architecture

ARCHITECTURE has long been regarded and still is properly classified as one of the fine arts. Every element of tradition in the profession has served to confirm this classification and to emphasize in the mind of the architect the fact that the profession is primarily an art. All this is, of course, fundamentally sound, and I have no quarrel with it in any particular, except in so far as it is sought to regard the profession as an art solely and to disregard the everyday prosaic businesss elements entering into the practice of it. During recent years especially, it has become increasingly apparent that architecture has a business side, as well as an artistic side, and that the architect who would protect his client's interests and his own rights and avoid serious embarrassment and loss must recognize the fact that this is so.

Architects, as a class, unquestionably regard the artistic element as paramount, and it is right that they should do so. The difficulty is that very many —the great majority, I fear—persist in viewing their profession as an art alone, and seem to have a feeling that in some way directly or indirectly they are untrue to that art, if they deign to practice it on a basis of business efficiency and organization. For years I have been preaching to my architect clients the doctrine that this point of view is false, that the profession can be followed with due regard to its standing as a fine art, and without cheapening its standing as such in any way, and that at the same time, due regard may be given to the rules of business organization and conduct. In other words, I am heretical enough to believe that an architect may be a great artist in the truest sense of that term and at the same time a man possessed of sound business sense and judgment, and that he may organize his office on business principles and conduct it on a basis of business efficiency, and at the same time develop work of the highest artistic and architectural excellence. In fact, I know that this is so, because some of my very good friends and clients in the profession—men whose work is nationally recognized as deserving of the warmest praise—are also keen business men, who deliberately make use of their business judgment and ability for the express purpose of safeguarding their own interests in the practice of their profession, and the interests of the clients whom they represent. If one consider the elements entering into the practice of architecture today, he must realize that the drafting of specifications, the securing of estimates, and the drafting and operation of the building contract, while part and parcel of the primary purpose to achieve an artistic result, have, nevertheless, each of them a purely business side. All of these phases of the work, the superintendence of the job, the arranging with the client for the payment of the fee due, and like items entering into the construction of every work undertaken and carried out, are fundamentally business propositions.

Art and business are not so diametrically and hopelessly opposed as many would have us believe. They may well go hand in hand in the conception and execution of work at once meritorious from the point of view of the most fastidious artistic critic, and at the same time satisfactory and successful, in that it has been carried forward to completion on a sound business basis and in accordance with such business principles as are necessary to protect archiect, client and contractor alike. It is because I feel very strongly on this point and realize the benefit which must accrue to the architectural profession, by a more general adoption of business organization and principles by architects in their practice, that I am glad of the opportunity to contribute these articles to THE AMERICAN ARCHITECT; to hang up along the architectural highways, as it were, a series of danger signals, so that the architect who travels them may at least be able to sense the spots in the practice of his profession, where danger lurks, and to secure advice or perfect his judgment in time to avoid unnecessary loss and embarrassment to his client and to himself.

These danger points or "architectural quicksands," as I have called them, in the title, can be most graphically and interestingly illustrated by reference to actual cases and difficulties which have arisen in the practice of architects heretofore. I purpose

therefor to emphasize the points which I would make, by references to typical examples illustrative of the manner in which the architect may easily involve the client, the builder and himself, particularly, in difficulties and serious loss, for want of an understanding of the more important rules upon which the relationship of all the parties to the ordinary building operation are based, and for want of an observance on his part of rules which are fundamental in any successful business undertaking.

My good friend, Mr. Daniel P. Higgins, of New York, and Howard Dwight Smith, professor of architecture in the Ohio State University, and for many years a practising architect in New York, deserve the thanks of every architect for the manner in which they have, in their admirable writings in various architectural publications, emphasized the wisdom and necessity of organizing the architect's office upon a business basis and in accordance with the well-settled and recognized rules of business conduct and efficiency.

Mr. Higgins has, in his articles on the "Business of Architecture," set forth with admirable clarity and force the desirability and necessity of so organizing the office of the architect that the architect's practice will be carried on with business despatch and accuracy. He has shown that the ideal office organization, which he has so carefully and concisely outlined, is one which is at the same time entirely practicable. There is no reason why any architect can not organize his organization along the lines which Mr. Higgins has outlined, with such modifications to suit his own special conditions as may be necessary. The fundamentals are so clearly stated by Mr. Higgins and the details so nicely worked out that a careful study of his articles and the practical charts and suggestions embodied in them should convince the most skeptical that the points which he makes are well taken and the form of organization which he suggests admirable in its scope and detail.

It cannot be logically maintained that a man is any the less an artist because before undertaking his work he arrives at a clear understanding with his client as to what his compensation is to be, or as to the basis upon which he is to act. Similarly, he does not lose any of his artistic ability because he sees to it that his office is so organized that the business aspects of the contract, specifications, estimates and the like, and the engineering phases of the work, are passed upon by men trained to appreciate and check them, and that as the work progresses the sums becoming due to the contractor, the accuracy of the items embodied in the certificates, the payments to sub-contractors, and all of the other similar items entering into the usual building operation are checked by an employee with a reasonable working understanding of accountancy.

One of the most successful and artistic architects whom I know makes it his regular practice to assume a sort of guardianship over the interests of his clients in their dealings with contractors far beyond the point that the ethics of the profession require that he do this. In repeated instances he has called upon me for advice upon matters involving solely the client's interests, not coming within his province as architect as his duties are laid down in the canons of ethics or usually considered, and which he might quite conscientiously and properly have passed along to the client for attention and determination. He has done all this and has not "passed the buck," as he might have done, because he has realized that by reason of his special knowledge of the situation and facts involved and of the work done, and of the attitude of the contractor and the general psychology of the situation, he has been in a position to give valuable help to the client and to aid him in avoiding unpleasant and expensive complications. This architect has paid for such legal services from his own pocket, and yet, from personal observation, I am convinced that the practice which he has thus followed has been a very great asset to him in his relations with his clients, an element of prime importance in building up the reputation which his office enjoys, and a mighty good investment from every point of view.

The Value of Being Definite

IF I were asked to sum up in one word the greatest need of the architect of today in the successful practice of his profession—aside, of course, from artistic and engineering training and ability—I should unhesitatingly answer "definiteness." More troubles brought into my office by architect clients result from a lack of definiteness than from any other dozen causes combined. The architect may be a genius. He may possess all the artistic and mechanical ability and training in the world. He may have the most charming of personalities and very unusual opportunities to make it felt. Yet, if he has not acquired the faculty of being definite, he will sooner or later, if his practice be on a really worth while and successful scale, experience a jolt which will cause him embarrassment and difficulty, and in all likelihood substantial financial loss. "Be definite" should be the watch word in the office and throughout the organization of every architect who would avoid disputes with his clients, disputes between his clients and the contractors, disputes between the contractors and his own organization, and the danger of loss and entanglement in litigation.

XUM

If one trace the course of an architect's dealings with his client in a typical case, one will find that beginning at the first interview and continuing through the selection of the site, the preparation and submissions of sketches, plans, working drawings, specifications and details, and the general superintendence of construction, not a step is taken which can be safely taken on any basis other than one of definite and complete mutual understanding. If you were to tell the ordinary business man that he should be sure that everything is understood thoroughly in putting through a business deal involving the payment of large sums of money he would in all likelihood think that you were mildly insane in thinking that he would pursue any other course. And yet, if you suggest to the ordinary architect that in his first interview with his client, or at least at the interview at which he is finally employed and told to proceed with the work proposed, the matter of the compensation to be paid him and all of the other more important elements involved in his employment should be discussed, made clear and decided upon, the chances are about ninety-nine to one that he will tell you that he can not discuss these subjects with his client at that time, without creating a wrong impression and quite possibly losing the job in prospect. I can quite understand how the architect may feel that this is so, but as a practical matter, I am clear that the difficulty which he fears is, in the very great majority of cases, wholly imaginary, and that the client would, indeed, much prefer to start out with a full understanding of all the fundamental rights and obligations involved. I believe that he would not think less of the abilities of his architect because the latter desired to place his dealings upon a clear and business-like basis, and that his mental reaction would, on the contrary, be distinctly favorable to that architect who approached the job on such a basis of an accurate and thorough understanding.

CLINTON H. BLAKE, JR.

(To be continued)

Old Crosses and Lych Gates*

WHEN, under Constantine, the Christian religion was proclaimed to the then known world, among the efforts made firmly to establish the new faith was the obliteration, all over Europe of every existing evidence of the idolatrous religions then waning. This led to the substitution everywhere of shrines or crosses, for the mythological emblems of the supplanted faiths. These crosses and shrines, first of a crude character, were simply monolithic shafts surmounted by a stone cross. With the growth and advance of Christianity the wayside shrine and cross became important landmarks and as such were dignified by all the embellishment that a newly awakened art could provide.

The custom of erecting shrines and crosses was early taken up in Great Britain and there the roadside became in a like manner embellished. More often erected to mark a pious impulse, they also stood as memorials of historic association. In their most rudimentary form these crosses, as stated, simple monoliths of stone, a shaft tapering often to a pointed apex. In many cases the roadside crosses became rostrums from which religious services were held. A base, generally of three stone steps, formed a circular platform from the center of which the base of the cross sprang.

It is interesting to trace the artistic development of these roadside crosses from the simplest, crudest form to the architecturally designed "Eleanor Crosses" that are the delight of archaeologists and the reverent pride of possession in the communities in which they are located.

The preaching cross, or cross with steps, became later developed as the market cross, set up in towns to mark the civic centers. From the platforms of these crosses were made the announcements to the public of matters of importance, and they were often used as pulpits where were held the religious services so much affected by the people of the Middle Ages.

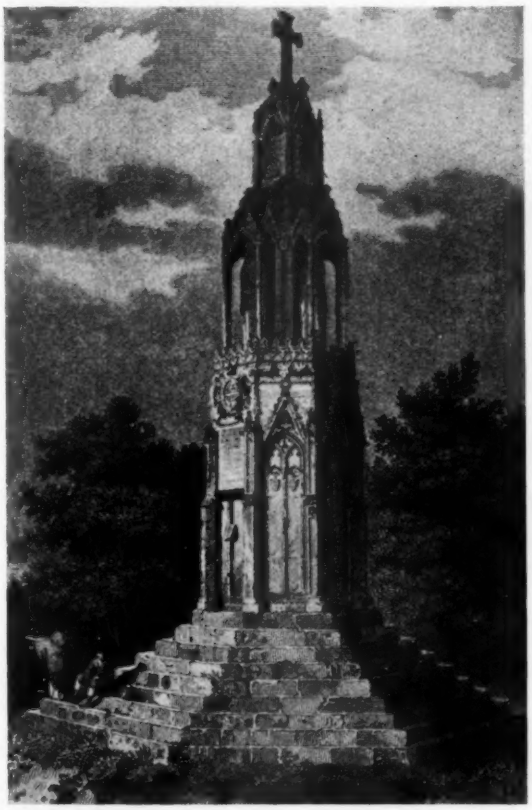
A careful study of these crosses develops a certain style as belonging to a certain period. They are held in veneration by the people of Great Britain, and their artistic features of design have been many times illustrated. Mr. Vallance has gathered and published in his interesting work a series of illustrations of these old crosses that constitute a valuable record and offer a wide field of suggestion in modern design.

The Lych Gate, or literally Gate of the Dead, is a picturesque feature of every English country churchyard. Through this entrance to the graveyard and pathway to the church door, the dead body was carried and here the bearers set down the corpse to rest a spell before carrying the body to the grave. As a rule these old Lych Gates were built of ma-

*Old Crosses and Lych Gates by Aymer Vallance. Full cloth, 190 pp., with many illustrations. London, B. T. Batsford, Ltd. New York, Charles Scribner's Sons.

terial the same as that used in the construction of the church structure, and also followed in design that of the church itself.

Their size and dignity varied. Early examples are of considerable size. They have a slab on which to rest the pall, with seats on either side for the bearers. Other Lych Gates are, as their name imply, simply gates with a roof or awning. In Mr. Vallance's volume already referred to there has been made by the author an attempt to classify these gates as to their design. These he groups as porch shape, in which the roof has the same axis as the passageway, the shed like form in which the roof runs transversely to the axial line of the passage-



THE ELEANOR CROSS, NORTHAMPTON

LYCH GATE, WITH COFFIN SLAB, AT CHIDDINGFOLD, SURREY

way, and a rare variety that combines both of these features.

Much of the charm of the English countryside is due to the picturesque construction and aging of these old gates through whose portals many generations have been borne to their final resting place in the church graveyard.

Acoustics of buildings

Architectural Acoustics

Transmission of Sound Through Doors and Windows

By PAUL E. SABINE

THEORETICALLY and practically the transmission of sound through partitions between adjoining rooms is a complicated phenomenon. The theoretical solution of the problem of the relative sound intensities on the two sides of a simple geometrical form, is difficult, perhaps impossible. Moreover, given the solution of the problem for the ideal case, its practical application would present even greater difficulties, since the assumptions necessary for the theoretical solution, do not in any considerable degree approximate the conditions to be met in actual construction. The only method of attack, therefore, is experimental, and since the number of factors entering into any particular problem is so great, and their relative importance is unknown, the experimental conditions must approximate the actual conditions of ordinary construction as nearly as may be, if the results are to possess any practical significance for the architect or the engineer. A laboratory experiment can be devised for measuring the transmission of sound through a single unit of building material, let us say, a terra cotta tile, a gypsum block, or a concrete slab. Whether the results of such an experiment would have any significance at all, when applied to the practical problem of the sound insulating properties of walls made up of such units, is problematical, since the latter depends upon the physical properties of the entire construction considered as a whole quite as much as upon those of the materials of which it is composed. In order to meet the necessity for securing test conditions which shall approximate those in ordinary practice, a special laboratory was built which has been described in detail in an earlier number of THE AMERICAN ARCHITECT.* It is hoped that by a thoroughly systematic study of many units and types of construction, a mass of quantitative data may be secured from which conclusions of general applicability may be drawn, as well as numerical coefficients by which the sound-insulating merits of materials and constructions may be compared.

It is important to distinguish at least two different processes by which the mechanical vibrations of a musical instrument or other source of sound in one room may result in the aerial vibrations of sound in an adjoining room. If the vibrating source is in solid contact with the floor, then the vibrations may be conducted directly to the floor, and thence along timbers or beams to the floor of adjacent rooms, there to give rise to the aerial vibration. A large proportion of the sound from a piano, cello, or any stringed instrument, resting on the floor, as well as the hum of motors or machinery, is transmitted through buildings in this way. Thus far no attempt has been made to deal with this aspect of the problem. In the second method of transmission the alternating pressure of the sound wave in one room produces vibration of walls or partitions, which in turn communicate their motion to the air of the adjoining room. Throughout the present paper, only this latter method of transmission will be considered. In the case of previous partitions such as felts or fabrics, the motion of the air may be communicated from room to room through the pores of the materials, with perhaps little or no motion of the partition itself. This latter case will be the subject of a later paper. The present report will concern itself only with the transmission by doors and windows made of impervious materials.

The method of conducting the tests was essentially that described by Professor Wallace C. Sabine, in an article published in 1915. The passageway between two adjoining rooms is closed by the partition under test. Sound is produced in one room, the Sound Chamber, and its intensity is made to decrease by stopping the source and allowing the sound to die away at a determinable rate by successive reflections from the walls. From the time required for it to become barely audible in the test chamber, on the other side of the partition, and the known rate at which it dies away in the sound chamber, the ratio of the intensity on the two sides may be computed. For the details of the method together with the precautions taken to insure that sound shall pass between the two rooms only by way of the partition under test, the paper just referred to and that in THE AMERICAN ARCHITECT of July 30, 1919, may be consulted. For convenience of the reader, a plan showing the arrangement of the sound chambers and the test chambers is given in Figure 1. The very low absorption of sound by the walls of the sound chamber, makes the duration of audible sound very great, thus allowing considerable precision in the measurements.

*The experimental study of the problem of Sound Transmission was begun by the late Professor Wallace C. Sabine in 1914. It was interrupted by the war. Meanwhile the new laboratory, which now bears Professor Sabine's name, was completed at Riverbank, Geneva, Illinois, by Colonel George Fabyan. A full description of the laboratory and its equipment appears in "The American Architect" of July 30, 1919. The present paper is a report on that portion which has been completed of the extensive program originally planned by Professor Sabine for this laboratory. Other researches are in progress, and will be reported from time to time.

Representation of Results

IT is of importance that the results of any scientific investigation intended for readers who are primarily interested in the practical rather than in the theoretical aspects of the subject, be presented in a form such that they may be applied to common experience. In the present investigation what has been determined is the ratio of the intensities of sounds covering the whole range of frequencies ordinarily used in music and speech, i. e., 64 to 4,096 double vibrations per second, on opposite sides of doors and windows of various sorts. Thus sound of the pitch violin C (512 double vibrations) is reduced in intensity in the ratio of approximately 100 to 1, in passing through a light panelled birch door, and in the ratio of 1,000 to 1 in passing through a steel door one-quarter of an inch thick. The significance of such figures is more apparent

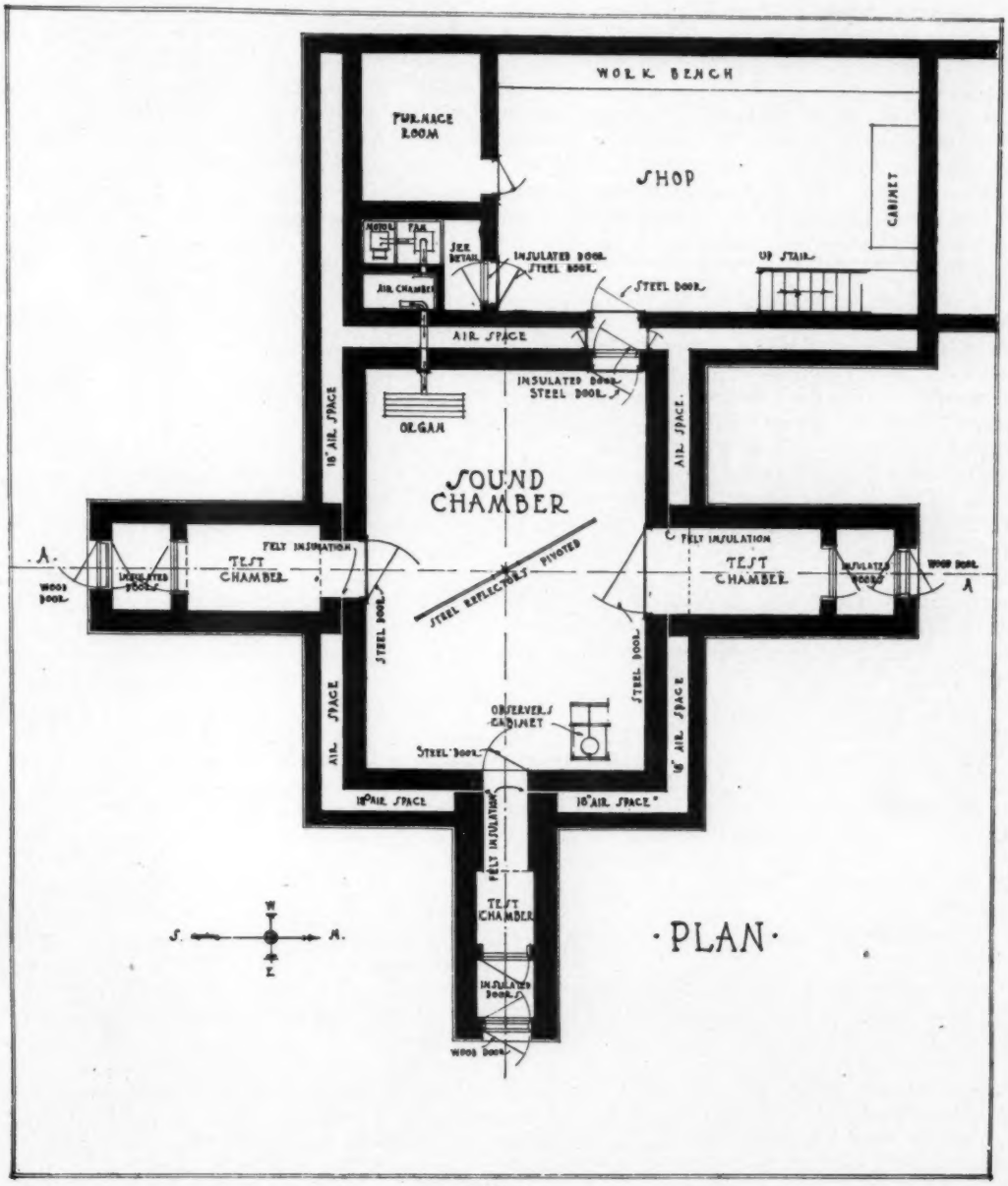


FIG. 1.

if it is recalled that in the open air at a distance from all reflecting surfaces the intensity of sound from a constant source decreases as the square of the distance increases. Thus increasing ten fold the distance between the source of sound and the observer in the open, produces the same reduction in the intensity, as is produced by the passage through the birch door. The steel door effects the same reductions as increasing the distance thirty-one fold. A further illustration: Ordinary conversation can be distinctly heard and understood through the light door mentioned above. It can be faintly heard but not understood through two such doors acoustically separated from each other. If it be assumed that the reduction in intensity in passing through the second door is equal to that in passing through the first (an assumption, which can be made only with certain important qualifications) then we have an idea of the effect upon the audibility of a sound of a reduction to one ten thousandth of its original intensity.

There are a number of ways in which the relative transmission of the various partitions studied might be represented. For example, the fraction of the sound, transmitted might be plotted as ordinate with the pitch of the tone as abscissa. The large difference between different constructions, represented in this way would, however, be misleading to one interested in the reduction of the audibility of the transmitted sound, since the sensation of loudness is proportional not to the intensity of the sound, but more nearly to the logarithm of this quantity. A very considerable difference in the measured intensity is necessary to produce a perceptible difference in the sensation produced on the ear. Thus it has been found that opening a hole three inches in diameter in the wall between two adjoining rooms in one of which was a continuous source of sound, increased the intensity of the sound transmitted to the other by about twenty per cent. Yet the change in loudness made by opening or closing a hole of this size could barely be detected. Thus it appears that while a difference of twenty per cent. in the sound insulating properties of two types of partitions is easily measurable, it is quite negligible in the problem of reducing the audibility of sound transmitted from room to room.

In the accompanying figures, the ordinates represent the logarithm of what may be called the *Reduction factor* of the partition in question. The *reduction factor for a partition is the ratio of the average intensity in the room in which the sound is produced to its average intensity on the opposite side of the partition and near it, no sound being transmitted except through the partition.* The logarithm of this ratio which is the length of the ordinate, measures roughly the difference in loudness on the two sides of the door or window, in question. Approximately one tenth of the unit ordinate represents a difference in loudness that is easily perceptible. This method of representation has the advantage of making the comparison between the various partitions in magnitudes that represent the audible sensations with which we are concerned.

Resonance Phenomena in Transmission

THE question as to the process by which sound produced in one room is transmitted through a solid partition, a steel door, for example, may be briefly considered. It is conceivable that the impact of the vibrating air particles on one side, may be imparted to the molecules of the solid and in turn communicated by them to the air particles on the other side. Thus a pulse of compression in the air wave would give rise to a similar pulse in the solid, and this in turn to the air on the other side. Both theory and experiment indicate that in thin partitions, transmission by this means is vanishingly small in comparison with the actual transmission. Experiment shows, on the other hand, that there is a flexural yielding of the partition under the alternating pressure of the sound wave, and that the vibration is communicated to the air by this flexural vibration of the partition. By a delicate mechanism, which need not be here described, the actual motion has been measured and has been found to correspond very closely to the vibration of the air particles in the sound wave, thus confirming the idea that transmission occurs very largely by flexural rather than compressional waves in the partition.

Theoretical considerations show that a partition of a type approximating a rectangular uniform plate, clamped at the edges, will respond to a series of tones of definite frequencies, in a manner quite comparable to that of a stretched string. The phenomenon is complicated, however, by the fact that two dimensions are involved in the response of the plate. In the case of the string the different natural frequencies of vibration are all multiples of a single fundamental frequency, the string vibrating in segments to produce the various frequencies to which it will respond. No such simple relation holds between the natural frequencies of a plate, since both its length and breadth enter into the phenomenon. Calculation shows, for example, that with frequencies less than one thousand, a plate of one-quarter inch glass of the dimension used in the tests, has some thirty-seven different natural modes of vibration. Its response to a tone of any of these natural frequencies would theoretically be much greater than to other nearby frequencies, and its transmission of sounds of frequencies corresponding to its own natural vibrations would be corres-

pondingly great. In other words, the phenomenon of resonance may well be expected to appear prominently in transmission measurements. The experiments amply fulfill this expectation, so much so in fact, that a thorough study of the properties of a single partition should involve measurements using a large number of tones taken at very small intervals of the musical scale, and entail an amount of work that would be prohibitively great. Arbitrarily, therefore, the seven tones an octave apart from C_1 64 to C_7 4096 vibrations per second have been used, and the reduction factor for each determined. Trials with intermediate tones have shown that although the intermediate points do not lie on a smooth curve, yet the general trend of the reduction of intensity factor, considered as a function of the pitch of the sound, is represented by the curves given. Moreover, the variations from the smooth curve are, in general, slight in comparison with the relatively large differences which are necessary to give one construction a decided advantage over another as a sound insulator in actual practice.

The securing of the data given represents a year's work. A large number of detailed questions have called for experimental study, with which it is not necessary to weary the reader, but which had to be answered before one could feel any assurance of the reliability of the results of the investigation. As an illustration, one may cite the question of the effect of the acoustic properties of the room into which the sound is transmitted upon the values of the apparent transmission as determined by this method.

The average intensity of sound in a room containing a steady source of sound is inversely proportional to the product of the volume and absorption of the room. When sound is entering a room through a closed door or window, the latter may be considered as such a source, and the average intensity in the room will depend not only upon the amount of sound transmitted, but also upon the acoustic properties of the room itself. The experiments showed that an increase in either the volume or the absorbing power of the receiving chamber, did effect a decrease in the average intensity of the transmitted sound, measured at a number of different points in the room. If, however, the observations are confined to positions near the transmitting wall, the effect of changing the amount of absorbing material in the receiving room is negligible, and a large change in the volume produces only a small change in the intensity thus measured. The curves in Figure 2 illustrate this effect. Curve 1 gives the logarithms of the reduction factor for tones of the frequencies shown. Curve 2 represents similar conditions, except that the volume of the receiving chamber is increased from 104 cu. ft. to 413 cu. ft. by the opening of a door arranged for the purpose. Further increase of volume produced no further appreciable effect. The point to be emphasized is that the apparent transmission of sound from room to room is in some degree at least a matter of the acoustic properties of the room into which the sound

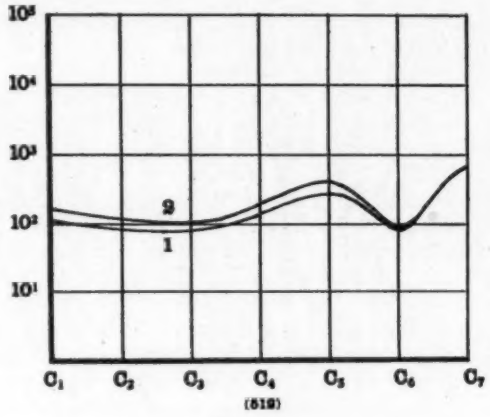


FIG. 2.

Curve 1. Reduction of intensity of sound transmitted into a small room. Curve 2. Reduction of intensity of sound transmitted into a larger room.

is transmitted, as well as of the separating walls. Experience shows that an appreciable reduction of noise in a room, transmitted from outside sources, may be secured by proper acoustical treatment of the interior of the room itself. In the results given hereafter the receiving chamber has been kept acoustically constant, with a volume of 413 cu. ft. the walls, floor and ceiling being of hard brick, cement and hard plaster.

In the later paper an attempt will be made to correlate the sound insulating properties of partitions of the type here considered with their mechanical properties of mass, viscosity and stiffness. For the present, only the results of experiment can be given. The units tested were of uniform dimensions 79 inches by 31 inches. The doors were set tight in a heavy frame of yellow pine, all cracks being carefully sealed with putty. The effective area transmitting sound was the same in all cases. Tests have been made upon some twelve different constructions. In order to save space, the numerical values of the reduction factor will not be given. They can be taken from the curves. The ordinate for any frequency as has been stated is the logarithm (base 10) of the reduction factor. The magnitude of the ordinate is a measure of the insulating property of door or window in question. The fraction of the sound transmitted is the reciprocal of the number whose logarithm is the length of the ordinate.

Windows

THE transmission by a window depends upon the quality and thickness of the glass, and upon the mode of setting in the sash. In Figure 3 the latter factor is the same for all three curves. Four panes, each 15 inches by 39 inches, were set in the sash described. Curve 1 is for a specially prepared three-ply material, consisting of two sheets of 1/16 inch window glass sealed together with an intermediate sheet of celluloid, the whole forming a 3/16 inch pane of approximately the same mass as ordinary plate. Curve 2 is for 3/16 inch plate glass, and curve 3 is for ¼ inch plate. The increase of insulating power of the heavier glass is clearly indicated. The increased reduction in substituting ¼ inch for 3/16 inch glass in telephone booths, for example, would on the average be that secured by increasing the distance from the source of sound in the ratio of 14 to 10. The lower reduction affected by the triplex glass is of interest. It is known that under certain conditions discontinuities in stiffness and density increase the insulating power of partitions. In the present instance, however, the decrease in rigidity occasioned by introducing the celluloid, probably, more than offsets any possible advantage

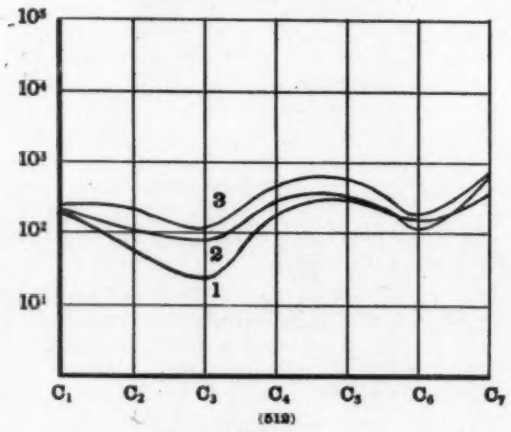


FIG. 3.

Curve 1. Reduction produced by triplex glass. Curve 2. By 3/16" plate. Curve 3. By ¼" plate.

of the discontinuities in the physical properties, which confirms the notion that flexural vibration is the important factor in transmission of sound by thin partitions.

The five curves in Figure 4 are for decidedly different constructions, but a comparison made in connection with the type of construction in each case proves significant. Taken in order, curve 1 is for a solid steel door ¼ inch think filling the doorway described. Curve 2 is for the four pane window of ¼ inch plate glass described above, curve 3 is for a single pane window of ¼ inch plate glass 79 inches by 31 inches. Curve 4 is for a window with diamond shaped panes 3/16 inch thick, leased in each pane having an area of 16 square inches. Curve 5 is for a twelve pane window of light construction of ⅛ inch glass, the panes being 10 inches by 19 inches. For the lower tones the reductions of intensity by the different partitions are in the same order as masses of the various partitions. That is, the more massive constructions produce the greater reduction in intensity for the lower tones. This order does not hold over the entire range of frequencies, however. For the higher tone the stiffness of the construction seems to be the more im-

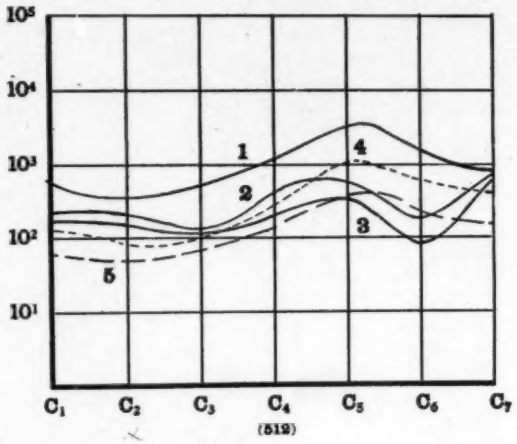


FIG. 4.

Curve 1. Reduction produced by door of ¼" steel. Curve 2. By ¼" plate glass with cross bracing. Curve 3. By ¼" plate without cross bracing. Curve 4. By 3/16" small leaded panes. Curve 5. By ⅛" panes 10" x 19".

portant factor. Inspection shows that curves 1, 4 and 5 have the same shape. Apparently this is to be accounted for by the added stiffness afforded the leaded pane and the twelve paned windows by the cross bracing of the sash. It appears that the well braced lighter glass constructions of 4 and 5 may be as effective in reducing the transmitted intensity of the higher notes as is heavier material use in larger units. The transmission from the form of curve given by the more flexible single pane to that of the rigid steel is shown by curve 2 for the four paned window.

The effectiveness of a so-called "dead air space" is often mentioned in connection with sound insulation. The curves of Figure 5 illustrate well a condition that must always be met if such a space is to produce the desired results, namely, that the "dead air space" must not be bridged by any solid connection, even at the boundaries, curve X represents the reduction produced by a single glazed two pane window, each pane being 31 inches by 39 inches, and slightly less than 3/16 inch thick. Curve 2 is for the

same window *double glazed,* that is, with glass set "on both sides of the sash." The separation between the two panes was about 1 inch. As appears from the curves, the sound insulation afforded by the two thicknesses of glass does not at all approach what would be expected upon the assumption that the second thickness produced a reduction in intensity comparable to that produced by the first. It is apparent that the vibration of the first pane is transmitted directly to the second through the sash and that the air space is quite ineffective. Curve 3 shows the results of an attempt to insulate the two panes by setting the second one in ½ inch saddler's felt rather than in putty. For the lower frequencies it appears that the felt is practically without effect, but that it does produce an improvement in the reduction of intensity for the higher notes. Further experiments on this point are in progress.

Doors

A LARGE number of tests on doors of various constructions have been made, detailed account of which may be omitted from present consideration. The results of four widely different types are presented in Figure 5. Curve 1 is for a light, four panelled door of birch veneer. Curve 2 is for a heavy solid oak door, well seasoned, 1¾ inches thick. Curve 3 is a heavy double walled door 4 inches thick, of yellow pine sheathing, filled with heat insulating material, of the type used in refrigerating and cold storage plants; while curve 4 is for the heavy steel door referred to above. The marked superiority in insulating power of the steel over the heavy "ice-box" door was scarcely to be expected in view of the generally accepted notions of the conditions for sound insulation. It was found that through the latter it is possible to hear easily and to understand with slight difficulty speech of conversational loudness. Through two such doors on opposite sides of a small vestibule it is possible to hear and understand very loud speech. The slight advantage of this type over the less massive solid oak door is also of interest.

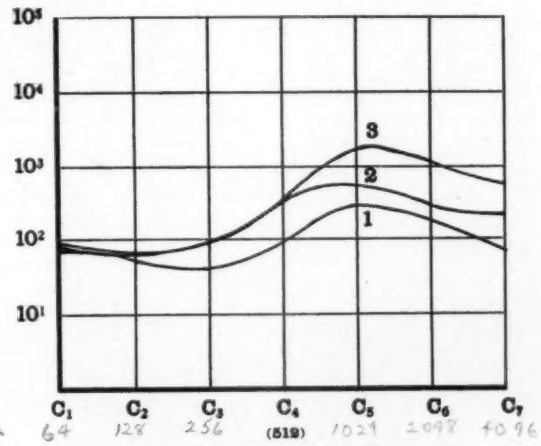


FIG. 5.

Curve 1. Reduction produced by single glazed window 3/16" plate. Curve 2. By double glazed window, with panes set in putty. Curve 3. By double glazed window, panes set in felt.

How important a factor the state of seasoning of a wooden partition may be is shown by curves 2 and 3 of Figure 6. Curve 3 represents the reduction produced by the oak door described, while somewhat damp from having been stored in a poorly ventilated room for several months. This was one of the first partitions tested. After having been kept in a dry room for a period of six months it was tested a second time, simply with a view to checking the earlier measurements. Curve 2 presents the results of this second test. The marked difference between the two tests placed the reliability of the method in considerable doubt, until a repetition of the early tests made on glass windows gave results in excellent agreement with those originally obtained, indicating that there had been a change in the properties of the wood through drying. The increased transmission for the extremely high and low tones of the dry, over the damp door, suggests the more nearly uniform response to the whole range of tones of the well seasoned old violin or 'cello, as compared with the "green instrument" of recent make.

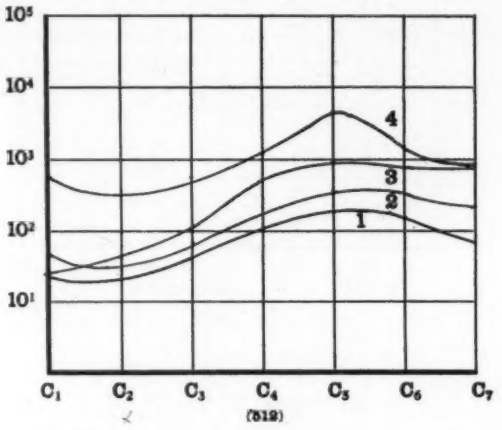


FIG. 6.

Curve 1. Reduction produced by four-panel door of light birch veneer. Curve 2. By solid oak 1¾" thick. Curve 3. By double wall "ice box" door. Curve 4. By door of ¼" steel.

In tests just described all precautions were taken to prevent the transmission of sound through cracks or openings of any kind. In practice, doors and windows are not closed air tight. The theoretical problem of the passage of sound through an opening is far from simple, and the practical problem calls

for an extensive experimental research. For the present the comparison of the reduction of intensity produced by a door sealed "air tight" into its casement, and that of the same door hung upon hinges must suffice. Curve 1 of Figure 6 is for the solid oak door, hung upon hinges and set so as to open

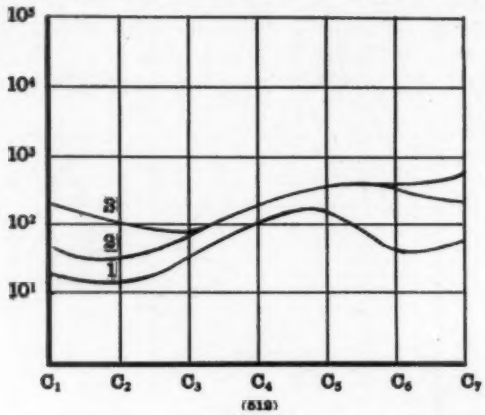


FIG. 7.

Curve 1. Reduction produced by 1¾" solid oak door as ordinarily hung. Curve 2. By the same door well seasoned and sealed air tight. Curve 3. By same door swollen with dampness.

and close freely. The very marked decrease in its effectiveness in shutting out sound is shown by comparison with curve 2. The experiment does not permit us to decide how much of this decreased effectiveness is due to the passage of sound through the crevices, and how much is due to the different mode of supporting the door. Other experiments on this point have shown, however, that the transmission of sound through long, narrow cracks, is surprisingly large.

In the foregoing enough has been presented to indicate the limitations and advantages of ordinary door and window construction in the way of sound insulation. The aim has been not so much to develop means for preventing completely the passage of sound from room to room as to secure reliable quantitative data on the transmission through partitions of ordinary construction. Such a study serves several useful purposes. The methods for securing the greatest degree of sound insulation under the conditions of common practice become apparent. Some notion of the relative importance of the various factors that together determine the degree of sound transmission is arrived at, and consequently a clearer idea of the direction in which improvement lies. Finally, commonly accepted ideas are submitted to the test of actual experiment. Thus the frequently expressed opinion that good heat insulation and good sound insulation are concomitant conditions is scarcely supported by the investigation thus far.

Along with this study of simple partitions there is being conducted a study of the more complicated problem of wall construction, in which the method is to secure data on the transmission of walls of various types in each stage of construction. A similar investigation on the efficiency of so-called "sound deadening" materials is being pursued. It appears evident that in none but the most thoroughgoing and detailed study can results be arrived at which will be of value in the practical solution of this decidedly complex physical problem.

Beaux-Arts Institute of Design

DIRECTOR OF THE INSTITUTE, LLOYD WARREN

ARCHITECTURE, WILLIAM F. LAMB — SCULPTURE, JOHN GREGORY

INTERIOR DECORATION, ERNEST F. TYLER — MURAL PAINTING, ERNEST C. PEIXOTTO

Official Notification of Awards—Judgment of March 16th, 1920

SECOND PRELIMINARY COMPETITION FOR THE 13th PARIS PRIZE

OF THE

SOCIETY OF BEAUX-ARTS ARCHITECTS

PROGRAM

The Annual Committee on the Paris Prize proposes as subject of this Competition:

"A SAILORS' Y. M. C. A. AT MANILA"

INTRODUCTION:

The entertainment of soldiers and sailors while on leave has been, during and since the war, the subject of a great deal of study and consideration by various societies and organizations. The Y. M. C. A., in continuing this work, wishes to establish at Manila a recreation center for the sailors from the visiting warships and the naval bases located there.

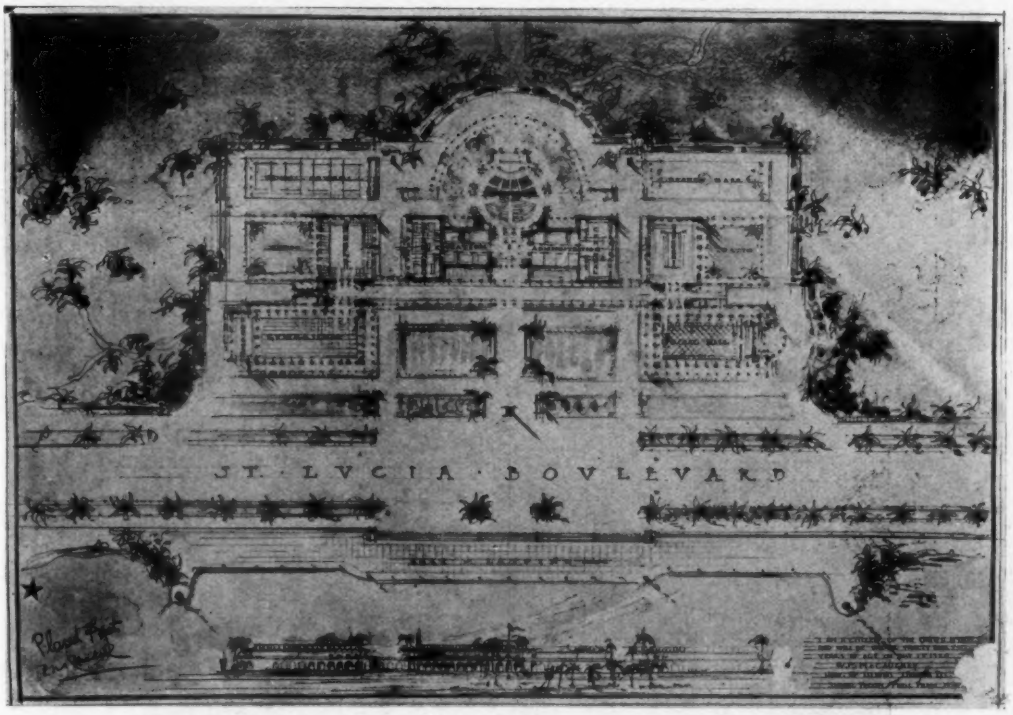
The climate is sub-tropical. It is desirable, therefore, that the plan be conceived in such fashion as to provide adequate shelter from the sun, and to allow free passage to the breeze, securing in this manner, the greatest protection and comfort to those who are pursuing the various activities provided for them.

THE PROBLEM:

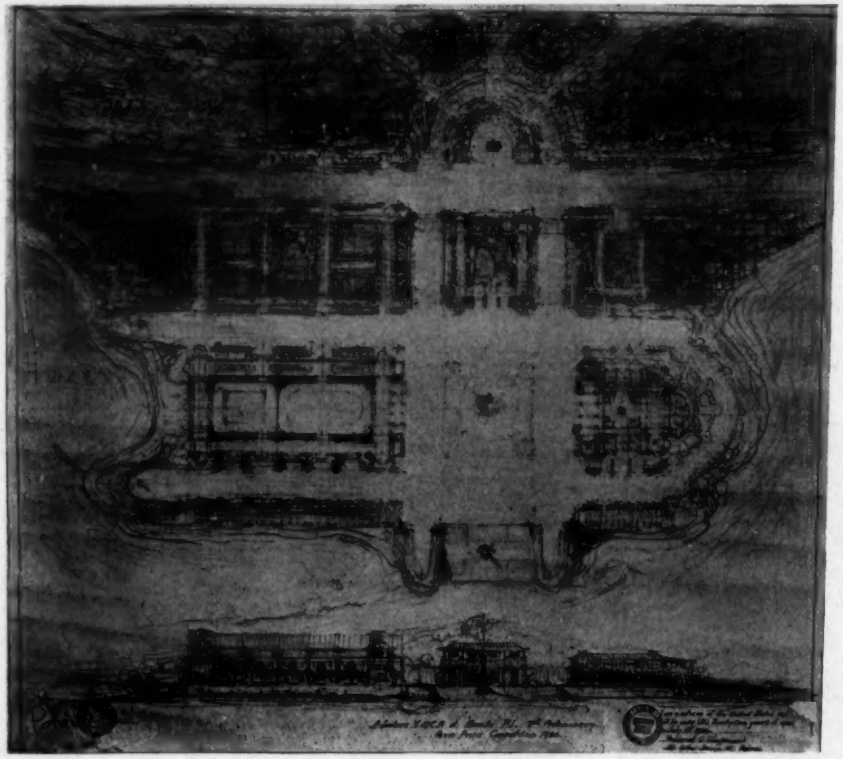
The ground to be occupied by this recreation center is on the harbor, easily accessible to the ships at anchor by means of launches and other small boats, and to the naval base by a boulevard which runs parallel to the shore front. It is rectangular in shape, and its greatest dimension must not exceed 600 feet.

Provision is to be made for the following departments:

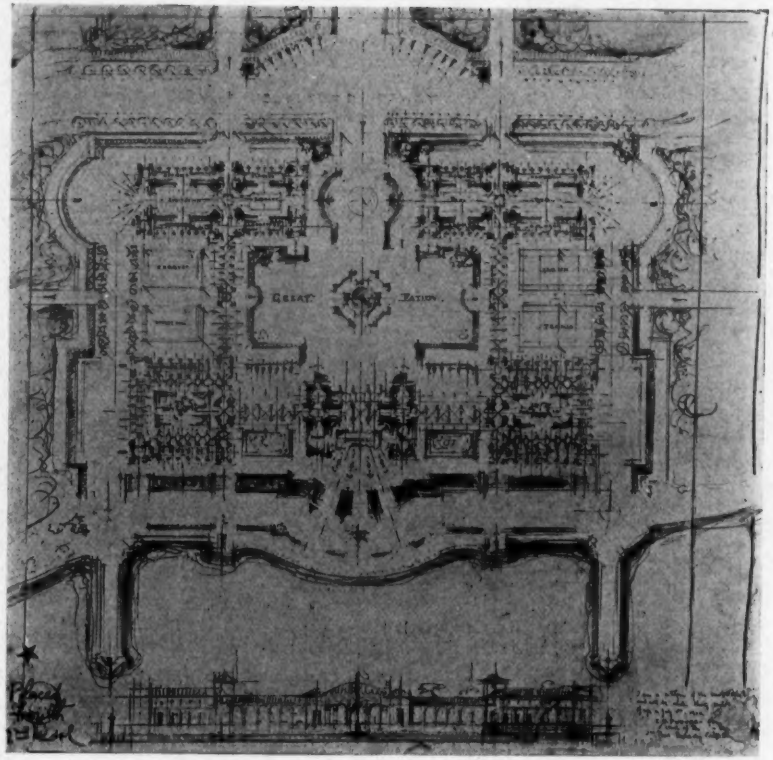
1. ATHLETICS:
   - Vestibule with stairways.
   - Physical director's room and examination rooms.
   - The gymnasium of not over 8,000 sq. ft. area, with running track and spectators' gallery.
   - A swimming pool not over 4,000 sq. ft. in area, with showers, baths, drying room, lockers, toilets and a barber shop.
   - Squash and hand ball courts.
   - There should be provided, out-of-door space for tennis, basketball and other minor sports. Baseball and football fields will be outside the grounds.



W. F. McCAUGHEY, Jr. — PLACED FIRST — UNIVERSITY OF ILLINOIS



F. A. CHAPMAN PLACED THIRD ATELIER A. BROWN, Jr.



E. R. PURVES PLACED FOURTH UNIVERSITY OF PENNSYLVANIA

STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN. SECOND PRELIMINARY COMPETITION FOR THE THIRTEENTH PARIS PRIZE.

2. EDUCATION AND ADMINISTRATION:

An auditorium for lectures, concerts and moving pictures to seat 500 persons.
A library.
Four or five classrooms.
A laboratory for general scientific education.
The offices for the general administration, including the central office and several secretaries' offices.

3. SOCIAL AND RESIDENCE:

Entrance lobby.

Number of drawings submitted—13.

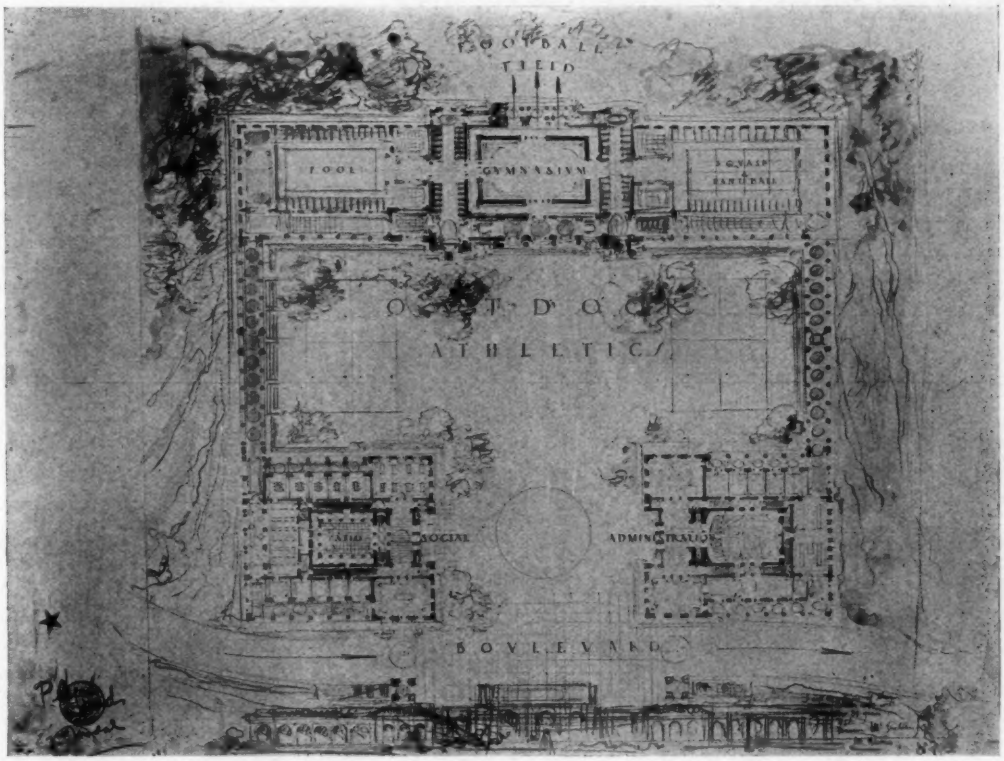
AWARDS:

PLACED FIRST (2nd Medal):—W. F. McCaughey, Jr., Univ. of Illinois, Urbana, Ill.

PLACED SECOND (2nd Medal):—D. McLachlan, Jr., Atelier Hirons, New York City, N. Y.

PLACED THIRD (2nd Medal):—F. A. Chapman, Atelier A. Brown, Jr., S. F. A. C., San Francisco, Cal.

PLACED FOURTH (2nd Medal):—E. R. Purves, Univ. of Pennsylvania, Philadelphia, Pa.



D. McLACHLAN, Jr. PLACED SECOND ATELIER HIRONS

Social hall.
Billiard room (8 or 10 tables).
Several small club rooms and card rooms.
Outdoor rest rooms or porches overlooking the bay.
Cafeteria for about 300, with serving pantry. (The kitchen and store rooms may be in the basement.)
Dormitories for 200 men on the floor above.

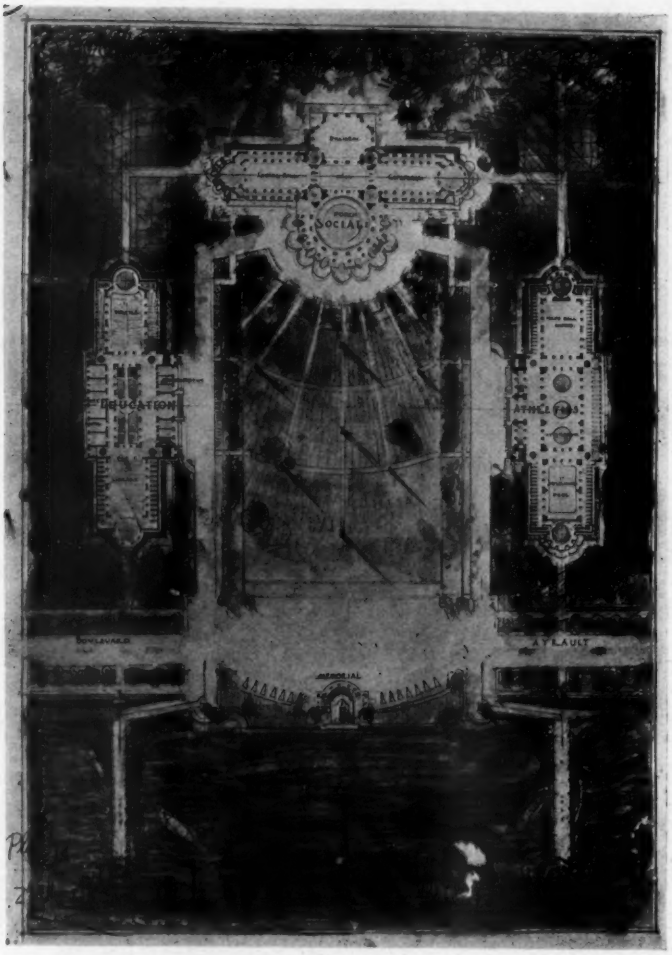
JURY OF AWARD: L. Warren, H. R. Sedgwick, W. F. Lamb, R. M. Hood, F. A. Godley, J. O. Post, W. L. Bottomley, L. Ayers, W. Van Alen, M. J. Schiavoni and R H. Dana, Jr., chairman.

PLACED FIFTH (2nd Medal):—R. S. Simpson, Pittsburgh Archtl. Club, Pittsburgh, Pa.

PLACED SIXTH—FIRST ALTERNATE (Mention):—E. L. Howard, Cornell University, Ithaca, N. Y.

PLACED SEVENTH—SECOND ALTERNATE (Mention):—J. K. Smith, University of Pennsylvania, Philadelphia, Pa.

MENTION:—A. F. Stokes, Harvard University, Cambridge; F. J. Kuchler, University of Pennsylvania, Phila.; L. Simpson, Washington University, St. Louis; L. Fentnor, Atelier Wynkoop, N. Y. C.



R. S. SIMPSON PLACED FIFTH PITTSBURGH ARCHITECTURAL CLUB
SECOND PRELIMINARY COMPETITION, PARIS PRIZE,
BEAUX-ARTS INSTITUTE OF DESIGN

Living in the South

As a temporary relief measure to meet the embarrassing shortage of homes in the Birmingham district, owners of vacant lots are finding it expedient to assist prospective home builders to get a roof over their heads by building on the rear of the said lots a small plain structure that can be made to serve as a dwelling for a small family, at the same time helping to combat the high cost of everything on several important counts. This emergency domicile will comfortably house a family of three or four people requiring but limited and what used to be inexpensive furnishings, and the housekeeping effort is likewise brief and inexpensive, while the interest on the total investment is comparatively small.

The big idea here is to await the day when lower building costs will permit the main house to be constructed at a very much lower price than that for which it can now be built. If this period happens to be deferred a few years the modest manner of living forced upon the rear-enders, as they may be termed, will enable them to catch up on other things, at the same time furnishing an opportunity for practical lessons in thrift that should be helpful in years to come. When in time the larger home is built on the front of the lot the emergency bungalow can be easily converted into a combination servants' house and garage where it will continue to serve a good and valuable purpose in the general scheme of a completed home.

Some fifty or more of these propositions have been worked out with apparent satisfaction and it is believed that in this way many will find a seasonably happy escape from the restricted and congested life of the small apartment in which people are now being packed away like sardines in a box.

New Loan Plan to Encourage Building of Houses

The announcement of a new policy with regard to industrial financing has been made by S. W. Straus & Co., who state that hereafter they will make loans in the form of first mortgage serial amortized bond issues in amounts of $500,000 and over to reliable industrial corporations engaged in the production of essential commodities, the proceeds of the loan to be devoted to the construction of dwellings for employees.

The opinion is expressed that large institutions should develop this field of financing because of the enormous demand for housing facilities and the stabilizing influence which widespread ownership of homes by the working classes will have. It is also predicted that the next few years will be a period of very extensive home building activities as a result of this co-operation between financial houses and industrial corporations.

EDITORIAL

Architectural Quicksands

THE first of a series of articles by Clinton H. Blake, Jr., of the New York bar, with an introduction by Daniel Paul Higgins, of the office of John Russell Pope, architect, appears in this issue.

Architecture differs from all the other arts to which it is allied, as in its practical application it is an exact science. There may be no "poetical license" in architecture. There can be no exercise of artistic fervor when the architect comes to that part of his work where the client's interests are concerned, or where his own should be safeguarded. Architects may indulge in the fervor of art while designing, may take certain liberties and exercise much personality in planning. Having passed those points and set out on a sea of pure commercialism in the construction of the building there are quicksands that, if success is to attend the final result, must be avoided.

The mariner has his charts from which he may learn the location of rocks and shoals, of currents and trade winds. All these insure a safe and speedy voyage. But architects have available few of these helps and safeguards. It is to supply some of them to the profession that Mr. Blake has been invited to prepare what we are sure the readers of THE AMERICAN ARCHITECT will agree is a most valuable and reliable series.

Model Making at Columbia University

AMONG the innovations that it will be necessary to effect in architectural educational methods will be the elimination of one dimensional portrayal of design, and the overcoming of the malicious influence of white paper on the mind of architectural students. All great architects have been known to possess in the highest development an ability to visualize their work in its three dimensions. Men who have achieved wide reputation as designers, who, through the medium of white paper and cleverly executed designs in elevation, have been able to create wonderfully beautiful conceptions, are known to be simply designers and not, in the fullest sense, architects.

Of recent years there has been a pronounced tendency to avoid these studentish preliminary representations and to substitute something that would in a more tangible way present the proposed building. What was desired was a method of three dimensions. Logically the model was the thing. But, except in rare cases, or in that of the monumental structure, there was no disposition to take up and encourage the creation of good architectural design by means of the model, and the long established custom of drawings on white paper, of elevations and details, has persisted.

The tendency has been to encourage good draftsmanship at the expense of good architecture. Men but recently graduated, whose ability to create good drawings or to make fine renderings in color, have been misled in their own opinions as to their ability as architects by the steady demand for their services.

All the methods of the past have trained the student largely in an appreciation in but one dimension. He has never had opportunity to see his work in any other form, and he has gone through his college training purely along that line. It is a satisfaction to learn that the first of, probably many and much needed reforms in architectural educational methods has been put into practice at the school of architecture at Columbia University in New York.

A DEPARTMENT of model making is now in operation at Columbia University, and in announcing this innovation it is stated: "It has long been appreciated that the student of architecture is trained largely in feeling for one dimensional architecture presented entirely upon paper and in the form of a plain elevation drawing. The student never has the opportunity which the practicing architect finds of observing his design completed in all three dimensions. This privilege only belongs to the architect who has secured his commission and has had his building erected at the ex-

pense of his client. Many such architects have been astonished at mistakes in their design due to the inability of drawings fully to represent the truth as it would appear in three dimensions. When the building is completed he has no opportunity of changing the form, and his mistake must stand as a glaring fault through many generations.

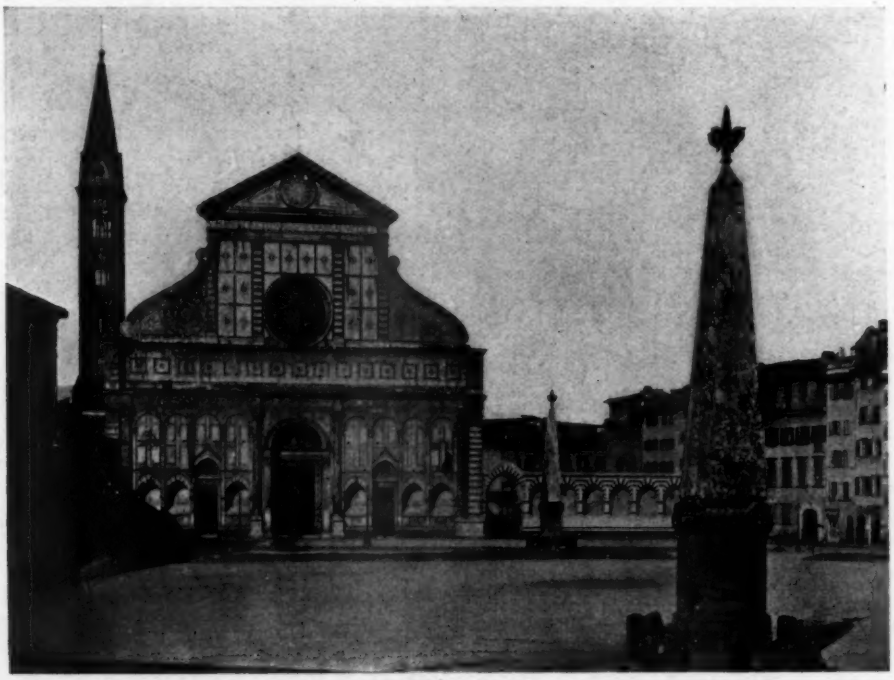
"The student of architecture who has designed a building or a group of buildings first on paper and then completed the same in the form of a model has all the opportunities of observing the mistakes of his design without the cost of erecting the building. Moreover, he has removed the malicious influence which pure paper design has upon his imagination.

"Many a designer who has unusual skill in drawing and rendering and who is blessed with an extremely fertile imagination is often able to mislead himself with his pictures and regard the thing he has erected on paper as beautiful architecture, while if it were constructed in three dimensions, in the form of a model, it would appear entirely absurd and ridiculous."

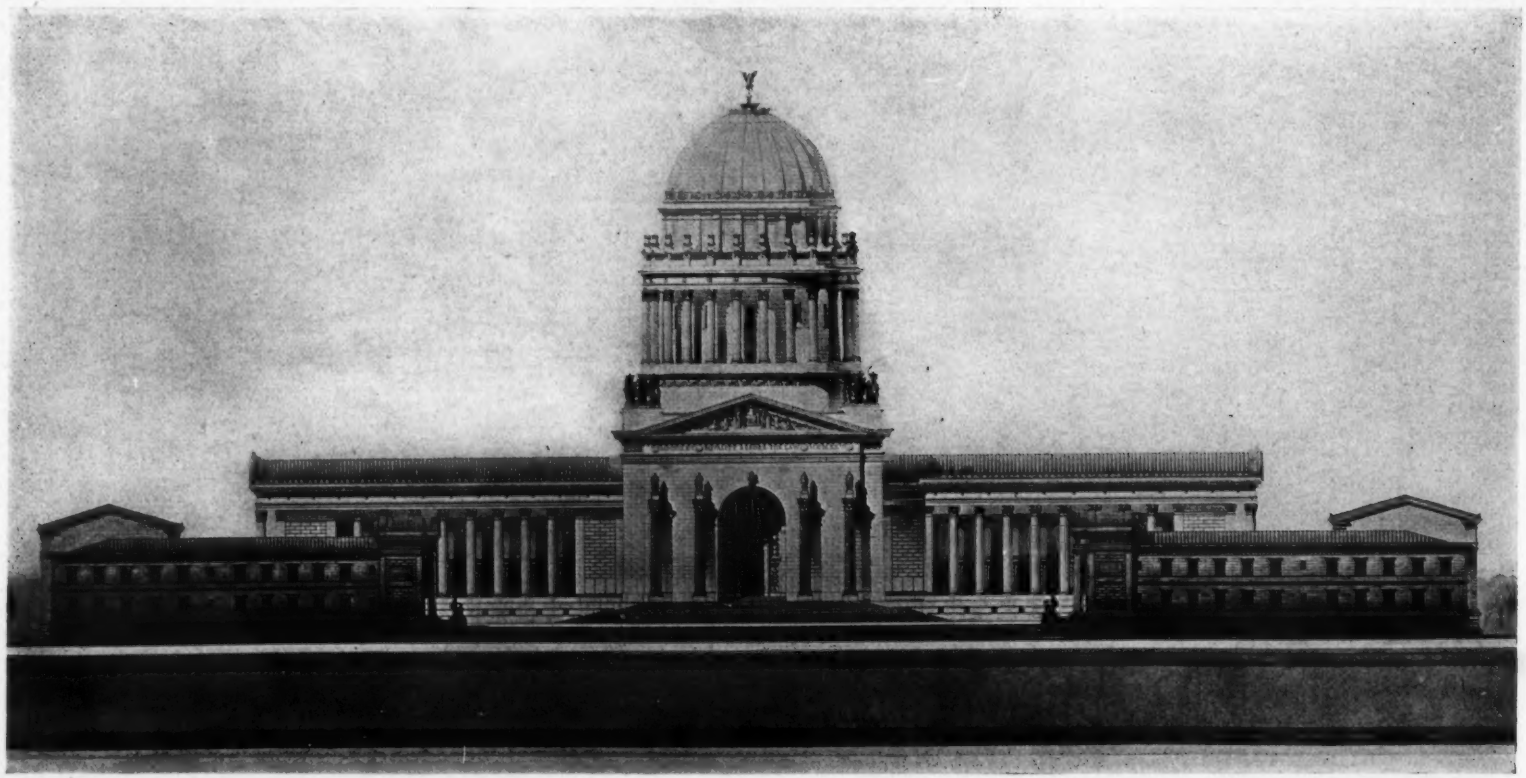
THIS is exactly true. There yet lingers in the minds of many teachers of architecture, and the impression has been conveyed to students, that model making is purely a mechanical process, one that may properly be turned over to some one less artistically educated. This is certainly all wrong. Much of the time now spent in the making of pretty but useless water color drawings might better be employed in coloring the models. There is a certain fascination in model making in noting the growth of the miniature and correctly scaled structure. Mistakes never apparent in the white paper drawing are constantly to be detected in the model and can be intelligently corrected. Further, there is the stimulation of the students' ingenuity in the simulation of materials and their texture and the development of planting effects. As a recreation from the hard mental concentration of the study of architecture, model making provides a means of relaxation that is greatly to be desired.

The development of scenic art is largely due to the use of the model for preliminary study. In fact, no production of consequence is begun until all the various effects of color, of lighting, placing and construction in general have been carefully considered in the small scale model. The design and construction of motion picture "sets" has grown to its present importance as the result of an intelligent and constant use of models.

Columbia University's school of architecture is to be congratulated in being the first of our important architectural educational institutions to recognize the importance of model making in the study of architecture.



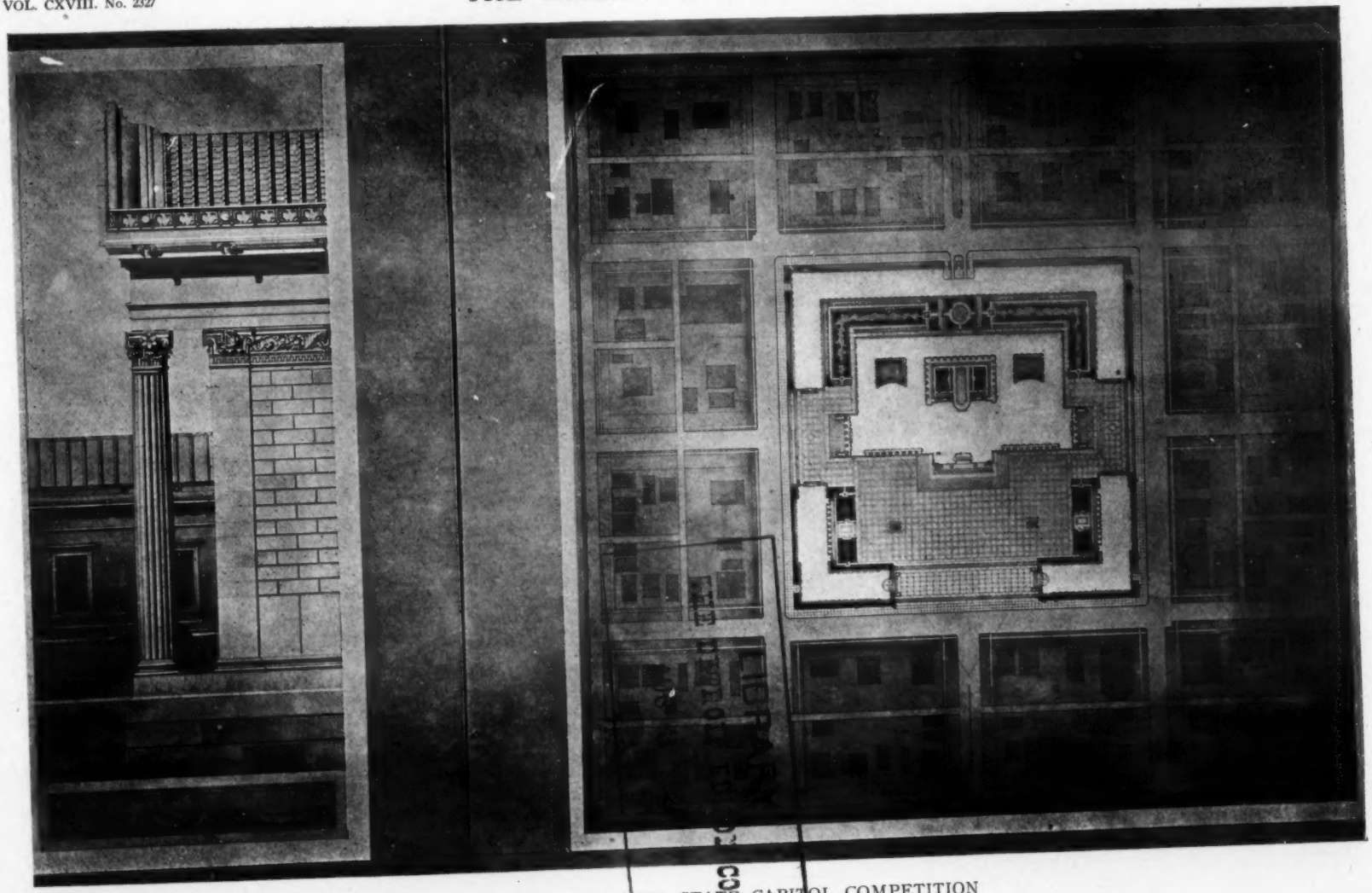
CHURCH OF S. MARIA NOVELLA, FLORENCE, ITALY.



FINAL STAGE, NEBRASKA STATE CAPITOL COMPETITION

DESIGN SUBMITTED BY

H. VAN BUREN MAGONIGLE, *ARCHITECT*



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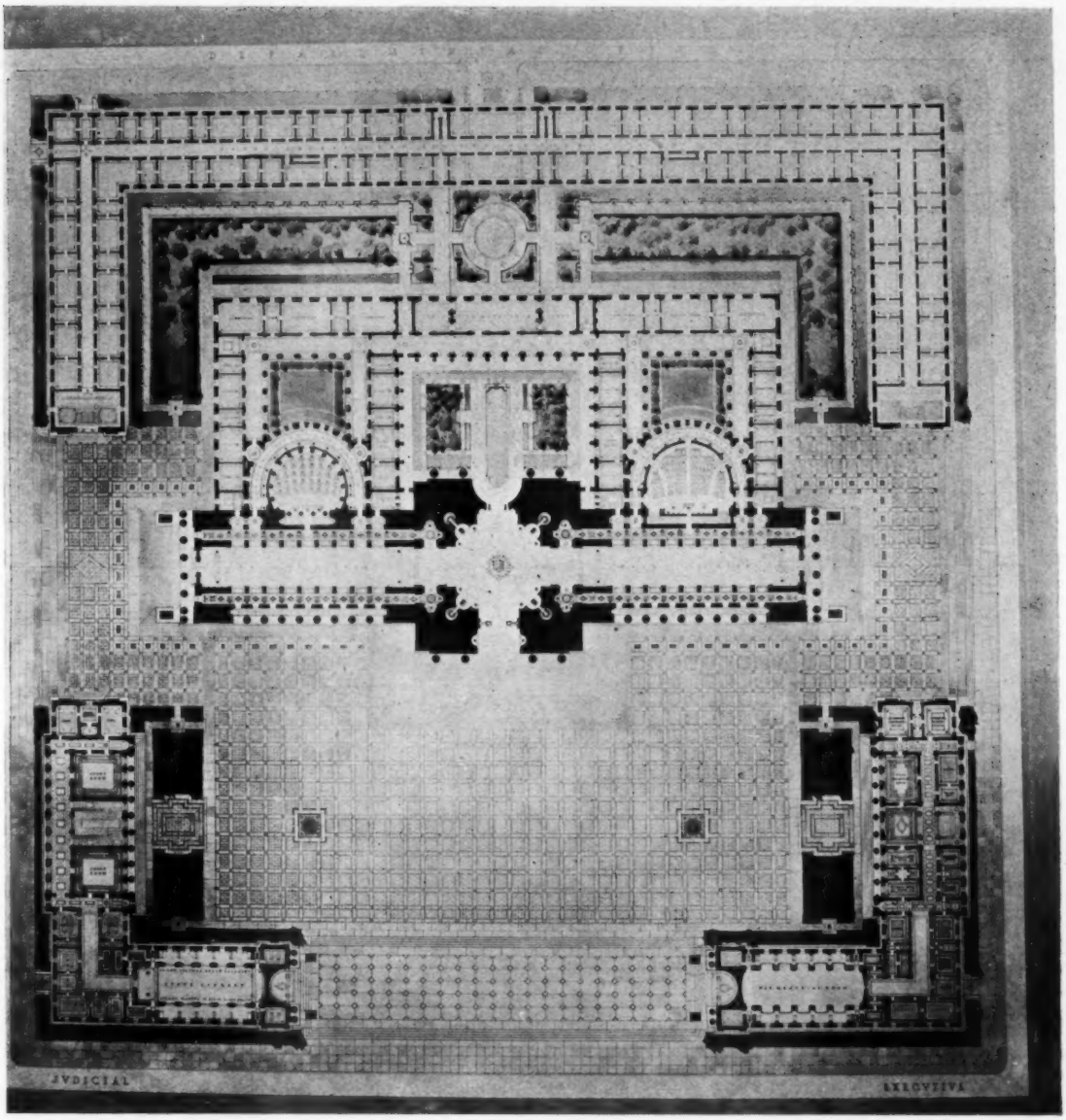

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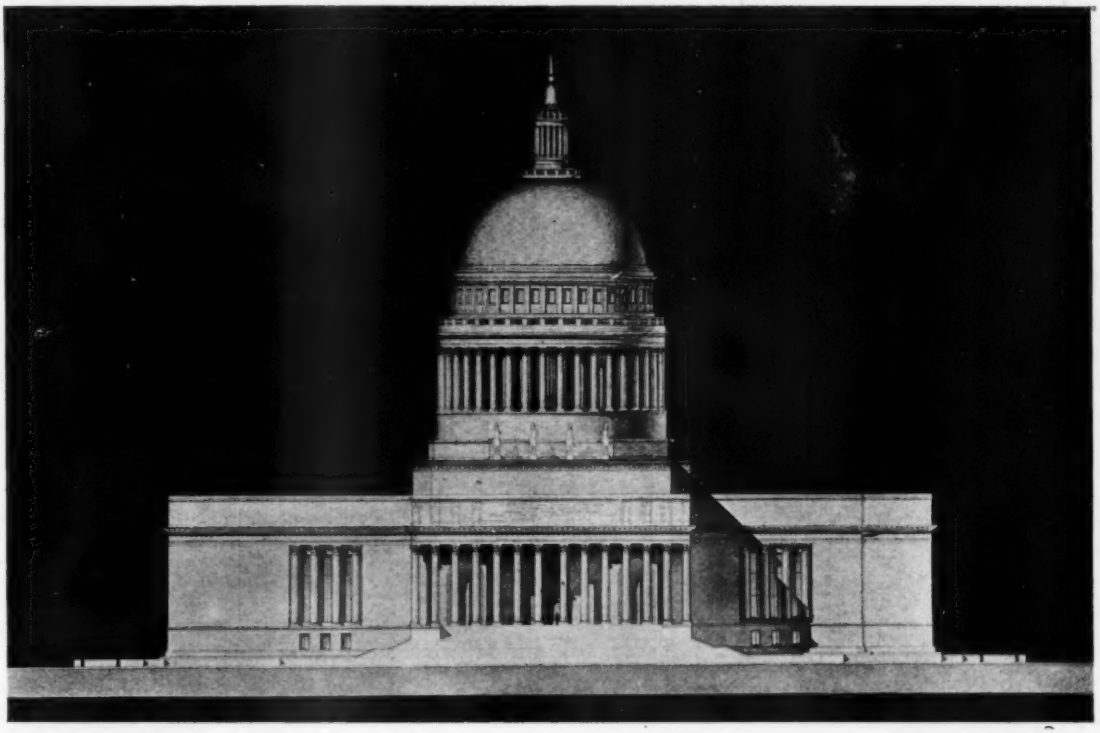
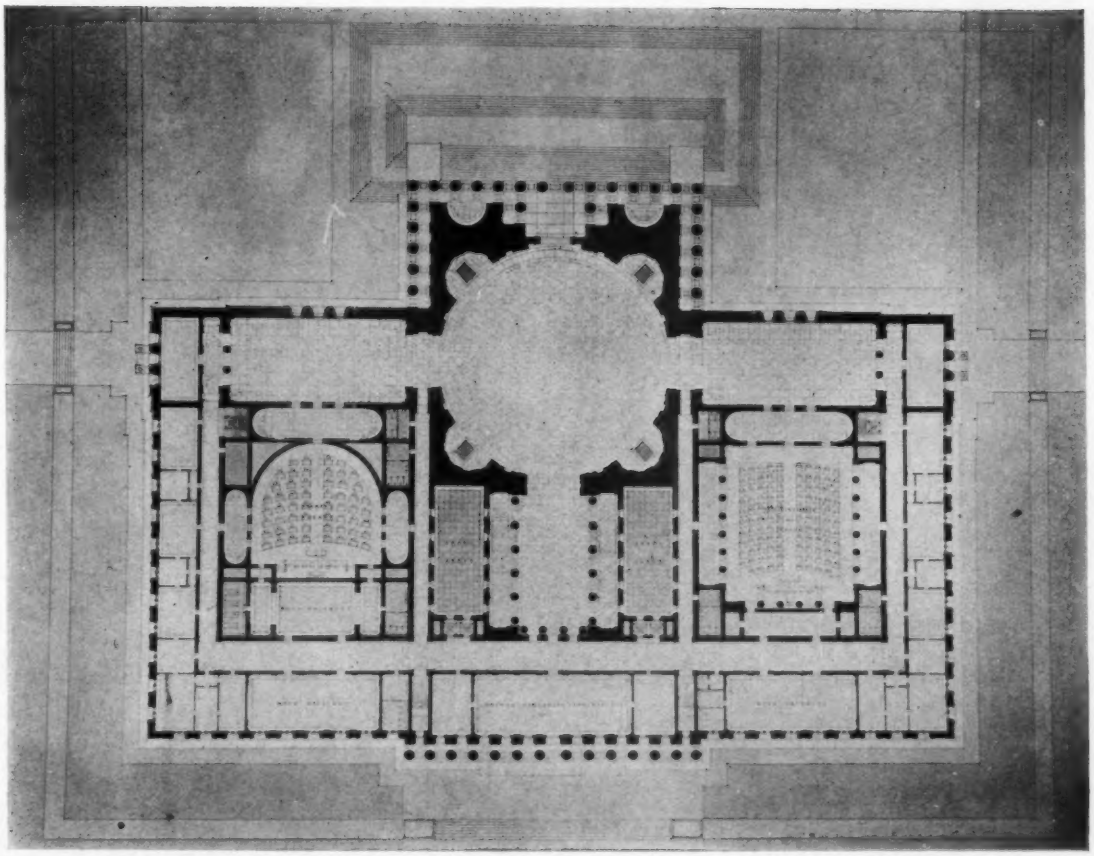
H. VAN BUREN MAGONIGLE, *ARCHITECT*

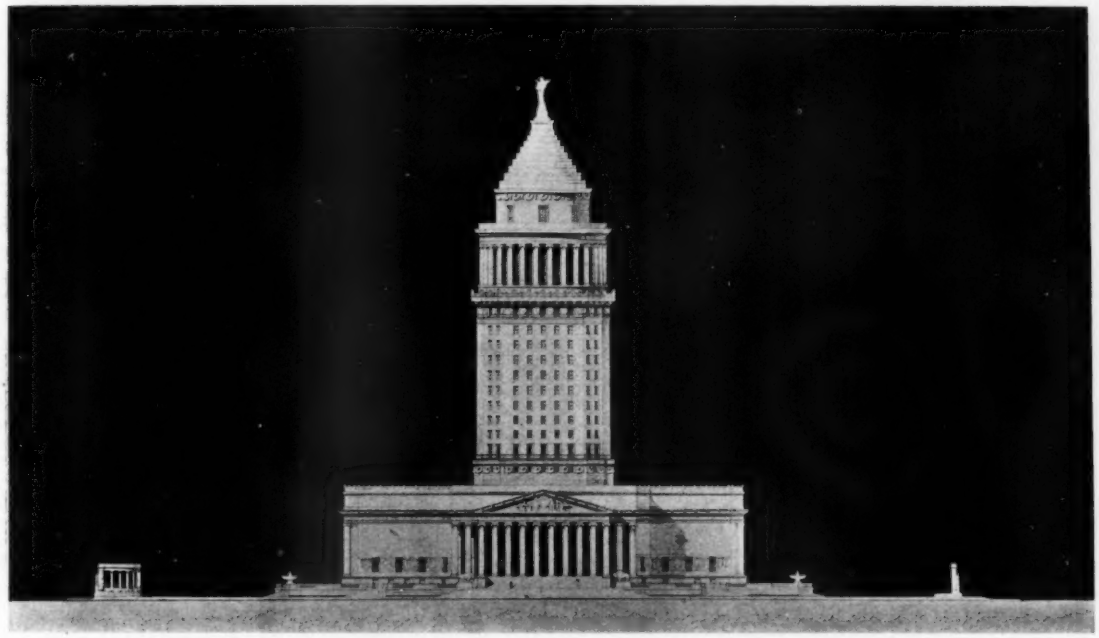
XUM

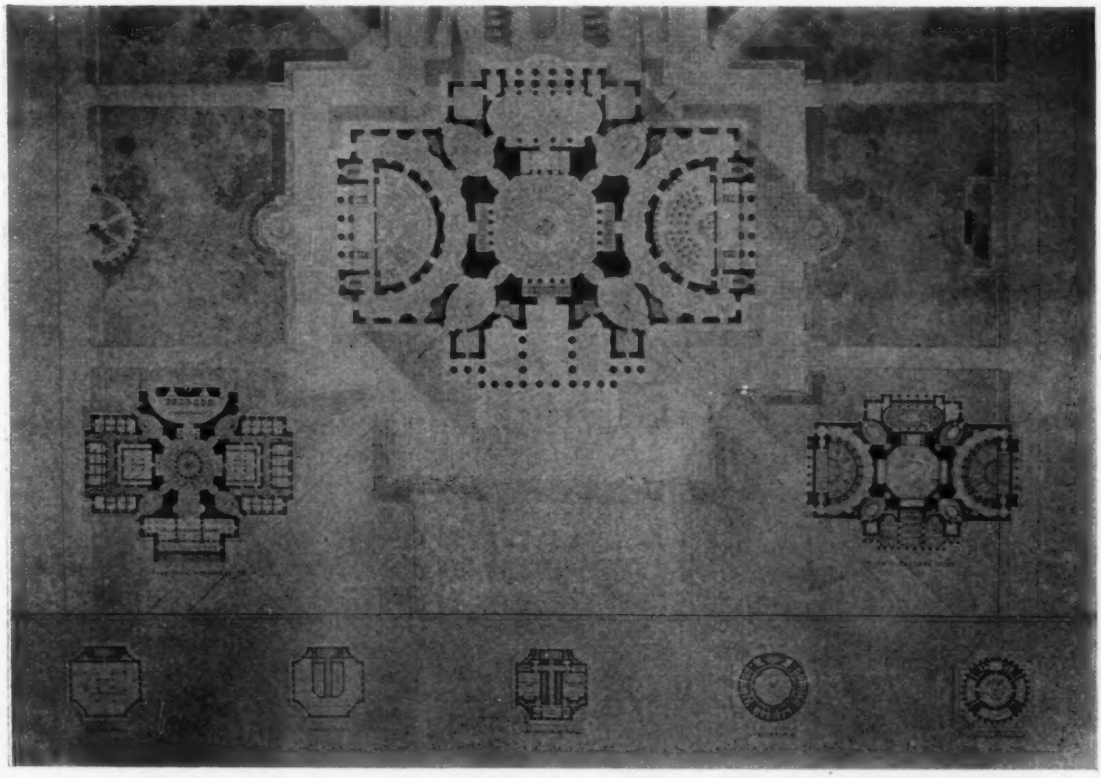




FINAL STAGE, NEBRASKA STATE CAPITOL COMPETITION
DESIGN SUBMITTED BY
BLISS & FAVILLE, *ARCHITECTS*

XUM





FINAL STAGE, NEBRASKA STATE CAPITOL COMPETITION

DESIGN SUBMITTED BY

ELLERY DAVIS, *ARCHITECT*

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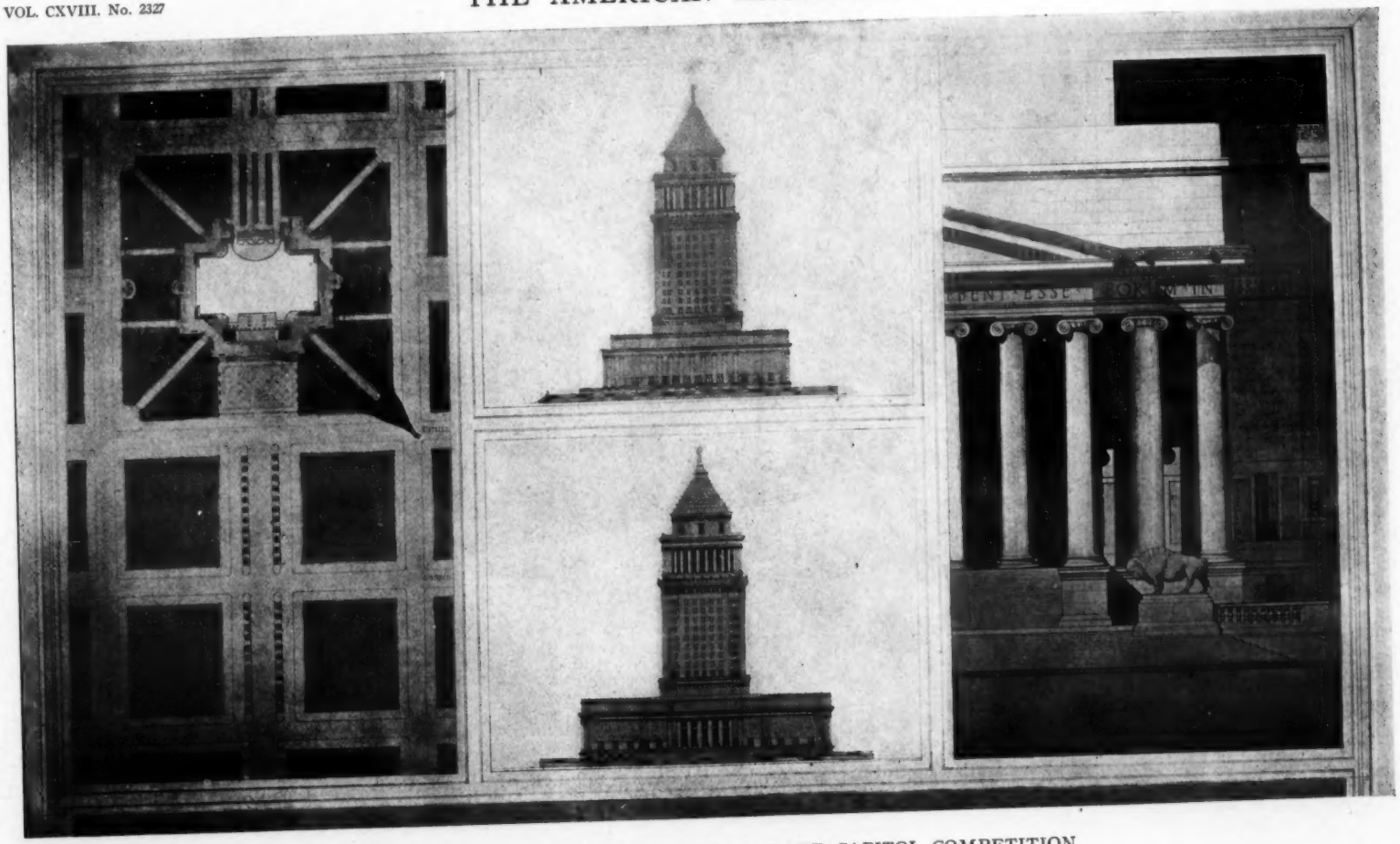


FINAL STAGE, NEBRASKA STATE CAPITOL COMPETITION

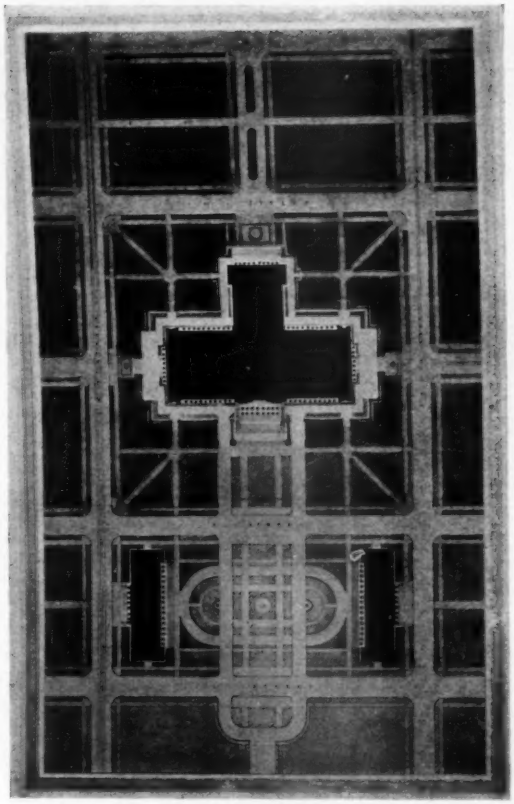
DESIGN SUBMITTED BY

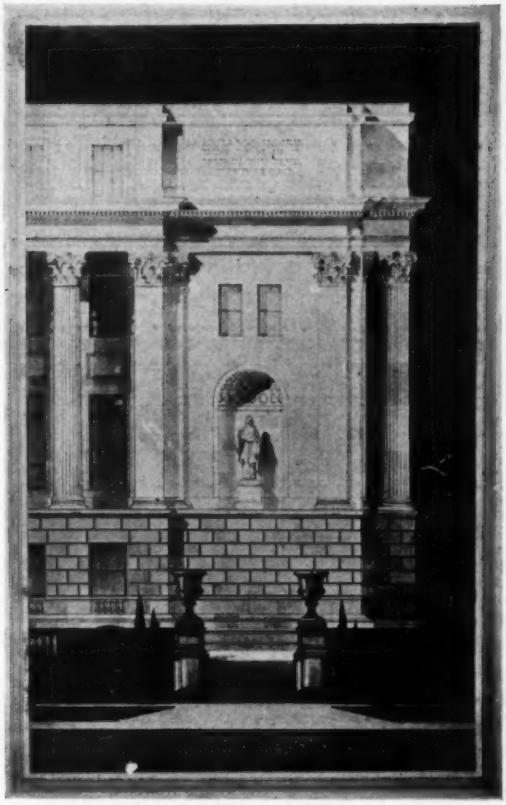
ELLERY DAVIS, *ARCHITECT*

FINAL STAGE, NEBRASKA STATE CAPITOL COMPETITION

DESIGN SUBMITTED BY

JOHN McDONALD and ALAN McDONALD, *ARCHITECTS*





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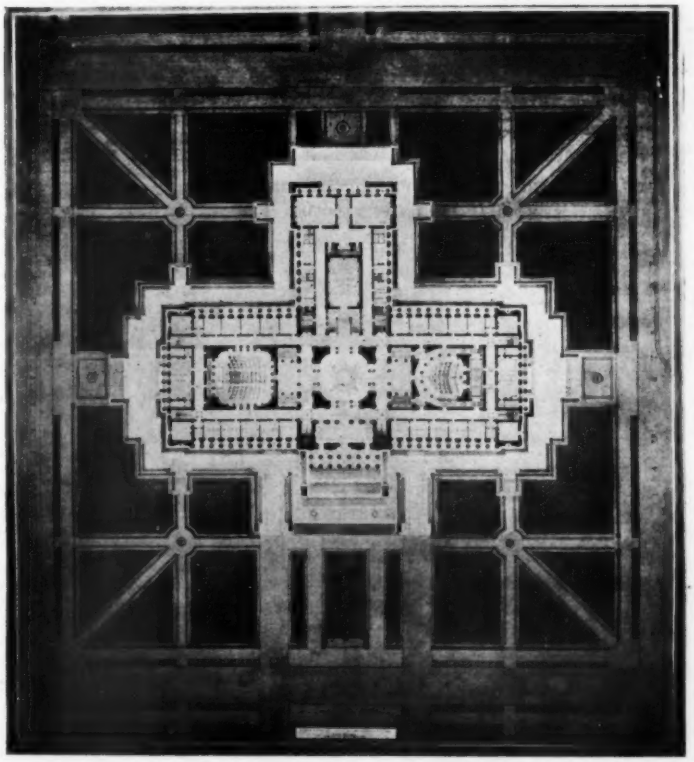

DESIGN SUBMITTED BY JOHN McDONALD and ALAN McDONALD, *ARCHITECTS*

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Current News

Happenings and Comments in the Field of Architecture and the Allied Arts

National Academy Elects Officers

At the annual meeting of the National Academy of Design, New York, Mr. Edwin H. Blashfield was elected president; Mr. Harry W. Watrous, vice-president; Mr. Charles C. Curren, corresponding secretary; Mr. Douglas Volk, recording secretary, and Mr. Francis C. Jones, treasurer. At the same time Mr. Max Bohm, Mr. Frank De Haven, Mr. August Franzen, Mr. Hobart Nichols, Mr. Carl Rungius, Mr. Chauncey F. Ryder and Mr. Robert Spencer were made academicians.

Minnesota Proposes State Federation of Architects and Engineers

Representative architects and engineers from all parts of Minnesota met at Duluth recently and took the first step toward the organization of a State Federation of Architects and Engineers.

The unanimous sentiment of those in attendance, as well as of other engineers and architects, who, for one reason or another, were unable to be present at the meeting, was in favor of such a federation. Only by unification into one state-wide organization will the engineers and architects of Minnesota have the power and weight of numbers behind them to force attention to matters of public concern having to do with problems of engineering and architecture, or with the regulation of affairs affecting the joint interest of these related professions.

It was pointed out by Max Toltz, chairman of the meeting, that there are about 4,800 engineers, architects and draftsmen in Minnesota. Many of these men are not identified with any existing organization. It is not the purpose of the men who are back of the proposed federation to supplant any existing organization, but it will be in fact what the name indicates, a federation of existing societies, and no man will be eligible to membership except through membership in his local organization.

Engineers scattered throughout the state in the smaller towns, having no engineering society, may join by becoming associated with the Minnesota Surveyors' and Engineers' Society, which has state-wide membership. The same is true of architects, who are eligible to membership in the Minnesota Society of the American Institute of Architects.

The engineers and architects who attended the Duluth meeting were the guests of the Duluth Engineers' Club. The meeting was held at the Commercial Club. It was called to order by W. C. Armstrong, engineer, of St. Paul. Mr. Toltz was elected chairman of the meeting, and Professor Frederick Bass, of the University of Minnesota, was elected secretary.

Wins Beaux Arts Prize

P. McLaughlin, Jr., a student at Atelier Hirons, this city, yesterday received the annual Paris Prize of the Society of Beaux Arts Architects. The prize amounts to $3,000 for study abroad, and by special arrangement the winner is allowed to enter the most advanced class of the Ecole des Beaux Arts in Paris, a privilege which is denied all Frenchmen.

The designs called for by the conditions of the contest were for the proposed war memorial for the city at the northern end of Manhattan Island, on the wooded knoll between Dyckman street and Spuyten Duyvil Creek. Five designs were selected for the final competition. Mr. McLaughlin's were placed first in the jury's award, and the four others were rated in the following order: R. S. Simpson, Pittsburgh; F. A. Chapman, San Francisco; E. R. Purves, University of Pennsylvania, and W. F. McCoughey, Jr., University of Illinois.

The drawings were placed on exhibition at the Beaux Arts Institute of Design, 126 East Seventy-fifth street, where they will remain until July 24. The designs have no connection with the official memorial project. The full illustrations of the prize winning and other designs will appear in our issue of July 28.

Prizes for Fifth Avenue Buildings

The Fifth Avenue Association will resume the presentation of medals for the best new buildings and alterations in the Fifth avenue section this year. This practice was discontinued for a couple of years owing to the cessation of building. It is understood that will be made formally at the annual dinner of the association in November. The members of the Architectural Harmony Committee who make the decisions are as follows: Walter Stabler, chairman; Douglas L. Elliman, secretary; Michael Drecier, Robert D. Kohn, C. Grant LaFarge and H. Van Buren Magonigle.

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Chicago Improves South Water Street

Chicago's next big public improvement—which many experts consider as important to the city as the Michigan avenue link—converting the present narrow, congested, dirty, unsanitary, dangerous and ugly South Water street into a broad, clean, utilitarian and beautiful double decked boulevard and traffic thoroughfare, has recently received two tremendous boosts. One was the opening of the Michigan avenue bridge and the other was the more recent announcement that at last the South Water street commission merchants have signed an agreement and put up the cash to finance a magnificent new produce mart outside of the loop.

Payment for Estimating

In October, 1919, the American Institute of Architects, Engineering Council, and Associated General Contractors of America, appointed three conferees each, to discuss the matter of payment for estimating. These conferees agreed upon a report which was submitted to their respective organizations under date of February 17, 1920, and has since been under considerationg by them. Engineering Council, at its meeting June 17, adopted the conclusion in a report of a special committee to which the report of the conferees had been referred, as follows:

"Whenever in the execution of work, competitive bids are asked for on detailed plans and specifications, those invited to bid should be provided with such an estimate of the quantities involved in the work as the surveys, plans and specifications permit to be made. The intent of this requirement is that a single estimate of quantities should be made by or for the engineer, architect, or other representative of the owner, so that each separate bidder will not be put to the expense of making up a separate schedule of estimates. This latter practice not only means a needless waste in the carrying on of contract work, but also discourages bidders and causes repeated handling of official plans and specifications in making up separate schedules of estimates."

Percentage of Fires

According to the National Board of Fire Underwriters, the highest percentage of the fires which occurred last year, 68.5 per cent. was registered by "sparks on roofs," which is the natural result of the prevalence of wooden-shingle roofs in so many of our cities. "Defective chimneys and flues" held second place with a ratio of 66.6 per cent. and "lightning" the third with 51.2 per cent. "Petroleum and its products" stood fifth, with 42.5 per cent., disclosing the great need of education that will cure the housewife of the dangerous practices of accelerating sluggish kitchen fires with kerosene and gasoline cleaning with gasoline and using improperly constructed and cared for oil lamps.

"Open lights" in dwellings caused 39.1 per cent. of the losses in this column. Under this heading comes fires resulting from unprotected gas flames, candles, torches, tapers and similar dangerous means of illumination.

Farmer's Cooperative Associations in New Zealand

The farmers' co-operative associations in New Zealand have steadily developed until they are now important factors in the business life of the Dominion, and are very rapidly gaining in strength. The Farmers' Union Trading Co. of this city is now the second farmers' trading co-operative association, in point of size, in the Dominion. It has lately taken over important interests north of the city, and now claims about 10,000 members. This company is sending a representative to open up offices in New York City through which they expect to sell New Zealand products and to purchase supplies for this Dominion. The representative will arrive in that city about the first of October.

These associations are taking up different lines of development and trade. Some of the associations have under consideration building and operating their own floor mills, establishing hydro-electric plants for the benefit of members of the association, as well as using their influence for better roads throughout the Dominion. They are also interested in fertilizer and cement plants, and, in the aggregate, control a large portion of the business of the country.

Municipal Loan Association

The municipal employes of New York City under the supervision of the Mayor's Housing Committee have formed an organization to be known as the Municipal Employes' Building Loan and Savings Association. Shares are to be sold at the rate of 50 cents a month. The par value of the shares is to be $100. It is planned to sell 50,000 shares to the value of $5,000,000.

The money will be used to aid municipal employes to build homes. The organization will be conducted on the lines of similar associations.

When the charter is granted a mass meeting of city employes will be called and their membership solicited. The directors for the first year, according

to Mr. Doyle, will be Frank Mann, Tenement House Commission; Frank J. Prial, Deputy Controller; L. J. O'Reilly, Colin H. Woodward, Duncan McGuinness and William J. Walsh.

Novel Foundation Method

Builders and architects throughout the country have been interested in the new idea which was introduced with the construction of the 400-room addition to the Ambassador Hotel at Atlantic City, N. J., now practically completed. Under ordinary conditions the new structure could not have been opened, it is said, prior to September 1, so that the process has shortened the construction period by fully sixty days. It is believed that the success of the experiment will revolutionize construction methods where excavation is made in sand soil. In fact, the same method is now being applied in the new Ritz-Carlton Hotel operation in Atlantic City, as well as in the cases of other buildings where the soil formation is of a character to lend itself to the innovation.

Briefly, the scheme as carried out at the Ambassador Hotel addition, consisted of punching 1½-inch holes in the sand 18 feet deep. Well-points were then introduced and the water was pumped out from a level far below the surface. Eight hundred well-points were used constantly in preparing for the Ambassador Hotel foundation. The tip of each point was covered with a 60-mesh screen so that no sand was sucked up by the pumps. The excavation work for the caissons was therefore done in dry sand and no boxing was necessary. In this way the job proceeded much more rapidly, and the Thompson-Starret Company, who did the building work, say there will be no settling. A similar process has been used heretofore in digging tunnels, sewers and excavations of that nature, but the Ambassador Hotel job is the first where the new method has ever been introduced in building work of this nature.

Lincoln Highway Association Issues History of Work

The headquarters of the Lincoln Highway Association in Detroit have just published a handsome illustrated volume entitled "A Picture of Progress on the Lincoln Way."

This 40-page volume, profusely illustrated with photographic reproductions of scenes along the Lincoln Highway between the two coasts, traces the progress of the association's inception and work from 1913 to "the beginning of the nation's real era of highway building" in 1920.

In a preface to the book, which is the most pretentious publication ever put out by the Lincoln Highway Association headquarters, its author, A. F. Bement, vice-president and secretary of the Lincoln Highway Association, says:

"As a statement of the status of the American highway situation generally, as well as a report of the accomplishments on the Lincoln Highway specifically, from men who with the best of facilities have made it their business for six years to study, investigate and endeavor to mold and lead American highway sentiment, this booklet should be of interest to every American everywhere."

A portion of the publication is devoted to a statement of the vast progress made in Lincoln Highway construction during 1919. Several pages are also devoted to picturing and describing the army convoy run over the Lincoln Highway last year, while a complete explanation of the provisions of the Townsend Highway Bill providing for a Federal Highway System is given.

Anyone interested in gaining a brief picture of the work and accomplishments of America's foremost highway promotional organization should write to the Lincoln Highway Association headquarters for a copy of this booklet.

A Sacred Memorial

The women's committee of one hundred of the Valley Forge Historical Society has completed its plans and will begin work this week in the effort to raise the money for the completion of the Washington Memorial at that historic shrine.

This is a movement which deserves the hearty support of every American, both from motives of local and of national pride. As a people, we are none too careful of our historic places, and there are few in the country or in the world which can compare in interest with Valley Forge. As one of the great turning points of the Revolution it has a sanctity perhaps felt to a higher degree by visitors from a distance than by our own people.

When the plans of the society are carried out, Valley Forge will be not only a memorial to the soldiers of the war which made our country possible, but a memorial to all of those Americans who have given their lives for freedom since the nation's birth. The Hall of Victory is to be a memorial to the soldiers of the late war, and thus the past will be linked to the present in the honoring of all those of our nation who died that freedom might live.

Surely a project like this, which has as its motive the inculcation and the perpetuation of the highest form of national idealism that any country can know, deserves the support of the country at large.

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Personals

Mr. M. O. Leighton and Major C. T. Chenery, members of the American Society of Civil Engineers, and Mr. A. C. Oliphant, associate member of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, have formed a co-partnership under the name of M. O. Leihgton & Company, with offices at 700 Tenth street, Washington, D. C., for the purpose of engaging in general engineering practice and industrial representation before the Federal departments. Mr. Leighton and Major Chenery will continue for the time being as chairman and secretary of the National Public Works Department Association, while Mr. Leighton and Mr. Oliphant will continue service in the Washington Office of Engineering Council pending the displacement of that body by the Federated American Engineering Societies.

W. H. Rockefeller has opened offices at 214 Market square, Sunbury, Pa., for the practice of architecture. Catalogues and samples are desired.

Frederick A. Fletcher, architect, formerly located in the Lexington Building, Baltimore, Md., may now be found at 407 North Charles street.

E. L. Rice, Jr., Co., architects, are now practicing at 17 East Seventh street, Wilmington, Del.

Reed & Brothers, general contractors, have moved to 702 Orange street, Wilmington, Del.

Edmund Herrmann, architect, has moved his office from 328 Market avenue to 134 Cleveland avenue, Canton, O.

Severance & Van Alen, architects, have moved from 111 East Fortieth street to the southwest corner of Forty-first street and Lexington avenue, New York City.

L. C. Patton, architect, has moved his place of business from 597 Fifth avenue, New York City, to 2 West Fifty-sixth street.

B. S. King & Campbell, architects, may now be found at 36 West Fortieth street, New York City.

John A. Hamilton, architect, has moved from 32 Broadway to 126 Liberty street, New York City.

John D. Boyd, architect, has recently established an office at 105 West Fortieth street.

John V. Van Pelt, architect, is now located at 126 East Fifty-ninth street.

News Notes from Various Sources

British newspapers believe the laying of 30 bricks per man per hour is not a fair output.

* * *

"Sees Worldwide Housing Shortage" is title of article in New York Times, June 27, based on views of Frank Mann, Tenement House Commissioner, New York City.

* * *

About 60 per cent. of recent immigration has been composed of women and girls.

* * *

The United States Civil Service Commission announces the postponement until August 3, 1920, of the close of receipt of applications for the open competitive non-assembled examination for senior architect; salary $2,100 to $2,700.

* * *

"Go to School" drive will be conducted this summer by New York State Board of Education among the 200,000 illiterates and non-English speaking persons in Manhattan and the Bronx.

* * *

The seating capacity of Madison Square Garden, New York, will be increased from 8,000 to 20,000 by Tex Rickard, prize fighter, who has a ten-year lease. The traditions of the landmark will be preserved.

* * *

According to compilation by O. P. Austin, statistican of National City Bank, New York, in current issue of The Americas, debts of world now aggregate $265,000,000,000, compared with $44,000,000,000 at beginning of World War.

* * *

Between three and four miles of permanent highway is being built each day by the State of Illinois. The State Director of Public Works says he hopes to finish more than 400 miles before frost.

* * *

Graphic illustration of unprecedented rise since 1914 in cost of materials and labor which enter into New York City building construction were provided by C. A. Chase, member of subcommittee on building of Mayor's Housing Conference Committee, in special report. Mr. Chase's findings cover every phase of construction cost situation. They indicate advances in prices of building material ranging from 10 per cent. to 366 2/3 per cent. Show that labor costs have gone up, but not as much as material prices. Biggest advance in wages has been granted to common laborers and to plumbers' laborers, whose rate of pay has increased 300 per cent.

Weekly Review of the Construction Field

With Reports of Special Correspondents in Prominent Regional Centers

UPON transportation conditions depends the course of the building industry. At the present time prices and supplies of materials are almost entirely a local matter. Even when manufacturers are able to procure cars to make shipment, they usually find them to be available only for short hauls. So far as New York is concerned, although prices are said to be stiffening, no precise changes of any great interest have been announced.

The present and immediate future of the building industry depending as it does upon transportation, it is but one more disappointment to learn that "Order No. 7" which has restricted the use of open-top cars to the transportation of coal, has been extended until August 22. And there is but faint hope that the complaints made by the construction industry against this order will influence the Interstate Commerce Commission to change its ruling.

Upon the eve of the announcement of the decision of the Railroad Labor Wage Board, the Pennsylvania Lines made statement that they would immediately put into effect their intention to lay off 12,000 men in order to reduce operating costs and in the interest of efficiency. The various statements that this action has been enforced by a decrease in revenue have not been authorized. The company says, however, that "some men have merely held jobs" and although the company has 18 per cent. more men than at the time the Government took over the operation of the roads, it was necessary a few months ago to send locomotives to outside shops for repairs—an unprecedented situation. This is but another example of the restricted labor output.

In connection with the labor output, it is encouraging to read the report of the Merchants Association: "Although production per man per hour has not yet reached normal, it has been gradually improving since last September." They arrive at this opinion through the reports of 49 manufacturers. Twenty-three of these stated that the efficiency of their employes has noticeably increased, 5 say that although they have observed no increase they have sensed a better spirit, 17 say that they have observed no change and 3 have noted a decrease in efficiency. These same manufacturers reported in September that their labor was not more than 70 per cent. efficient.

(By Special Correspondence to The American Architect.)

Chicago:—The recent recommendation made by the Finance Committee of the City Council in regard to municipal wage boosts should make all thinking men in the building trades "stop—look and listen." The recommendation says in part: To balance union labor increases amounting to $965,000,000 the committee recommends that enough carpenters, painters, plumbers, bricklayers, etc., be laid off to save that sum.

Incidentally, city construction and repair work would be cut 20 per cent. under the plan. In the face of this recommendation it is reported that every building tradesman employed by the city will be called out "to see that labor gets its demands." The demands being in this case $10 a day for municipal shop work.

The union wage of $10 a day for "outside work" and $9 a day for "inside work" was recommended, but this was not satisfactory to the craft. While the tradesman shortsightedly insists upon a higher daily wage his working week is being steadily cut down.

The building boom which was confidently predicted would take place has failed to materialize. The man with money to build is playing a waiting game. While labor demands, contractors "pass the buck" and building costs steadily advance.

Common brick is now selling at $16 a thousand, an advance of $2 over a month ago. Crushed stone is now $4 a yard as against $2.85 and $3.50. Sand and gravel have also advanced, while cement manufacturers are refusing contracts and builders are offering premiums for deliveries.

All hope for a lower interest rate and a loosening up of credit condition which would do much to facilitate construction work has been given up. The current talk among bankers is to the effect that money rates may be stronger in the fall—7 per cent. is a minimum charge now for collateral loans, while commercial paper ranges from 7½ to 8½ per cent.

Building permits show a decrease of 66 2/3 per cent. under the same week of a year ago. They show 31 for the week at a cost of $582,400, as against 97 for the same week last year—valuation $2,606,300.

(By Special Correspondence to The American Architect.)

Seattle.—Prices, finance and car shortages have been submerged in the difficulty of getting skilled labor to turn out small pipe and nails, and the labor question is paramount as the cause of irregular delivery from eastern mills to North Coast jobbers.

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The pipe situation has not improved in 30 days, and while prices are stationary and no advance is expected, jobbers are passing through a critical period in taking care of not to exceed 40 per cent. of the demand.

Country buyers of builders' hardware and pipe are so thoroughly cognizant of the trouble that they are placing orders with large distributors here subject to shipment at the earliest opportunity. Jobbers are 60 days behind in filling orders, for nails and steel products excepting pipe fittings.

There seems no doubt in the minds of jobbers in this territory that the complaint as to difficulty of the eastern mills in getting skilled men who will work in the heat at the wages paid when they can secure easier environment elsewhere at as good a wage is sincere. Reduced production in consequence is anticipated for months to come. Only a small percentage of pipe needed is being delivered although building projects are not brisk. California jobbers have been reaching up into this territory with placements but jobbers have refused acceptance owing to the difficulty of taking care of their own territory. This enquiry from the south clearly indicates that stocks from the Canadian to the Mexican line are very low. Export orders also are being rationed while one length of small pipe is made to do the work of two. It is the opinion of jobbers here that normal conditions cannot return in the steel building industry in less than five years.

Colorado mills, which promised 50 per cent. of the small nail supply by July 1, have been able only to get out 40 per cent. of the requirements. Manufactured hardware which includes faucets and valves are coming this week more freely and jobbers' stocks are in fair condition. Satisfactory arrivals in fittings as against lean receipts of pipe is explained in the fact that the mills are concentrating what skilled labor they can get on turning out the materials that bring the highest profits.

Brick, plaster, plaster board, cement and patent roofing are offering two to one to the demand. Prospective construction of office buildings, which are two years behind in this city, is being deferred. Investors do not seem to care to pay present prices believing that they can save considerable money by waiting at least a year.

Red cedar shingles are stronger by 35 to 40 cents than ten days ago for clears and 75 to 80 cents higher on stars. The low points has evidently been passed. Standard clears, mill basis, are $4.30 to $4.50 per 1,000 and stars $3.85 to $3.90. A majority of the mills are down for a prolonged season of repairs. Fir lumber is firm to stronger. New price lists carrying higher quotations are believed to be impending.

(By Special Correspondence to The American Architect.)

San Francisco:—While no doubt much building has been postponed from time to time and is still being delayed on account of high costs of materials and labor, the first half of the year showed a big advance in construction work in and about San Francisco as compared with the first six months of 1919. Local architects, as well as contractors and building material interests consider the outlook bright for a proportionate increase during the latter part of 1920. The preparation of plans and specifications by the architects continues quite a bit ahead of the actual starting of work on many assignments, on account of the difficulty experienced in getting materials and labor to push the work along. Now a shortage of steel is one of the most serious drawbacks on large buildings in the downtown business districts. Not only is this shortage delaying the starting of certain buildings, it is halting work already in progress.

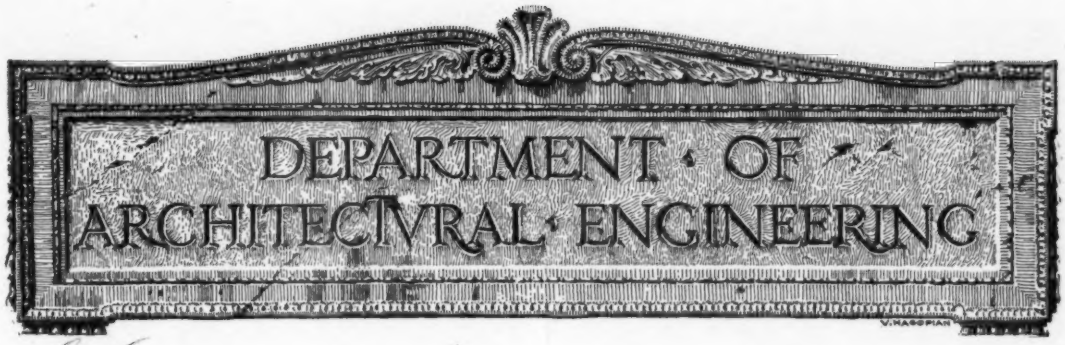
For instance, work on the California State Building on McAllister street, between Larkin and Polk streets, which is to complete the northerly frontage of the Civic Center, has been suspended owing to the delay in the arrival from the East of light sizes of structural steel required for floor beams. It is understood this contingency is confronting other contractors also.

(By Special Correspondence to The American Architect.)

Boston.—June building operations in New England amounted to $32,795,000 which was somewhat less than the May figure, although greater than that of April. The total number of contracts awarded during the first half of the year was 5440 and the amount involved was $178,854,000 as compared with 5070 contracts amounting to $82,111,000 for the first half of 1919.

Industrial building led in this section during the first half of the current year, amounting to $55,582,000 or 31 per cent. of the total. Other important classes of buildings were as follows: Residential $49,035,000, or 27 per cent.; business building $37,468,000, or 21 per cent.; public works and utilities $15,446,000, or 9 per cent. Contemplated or projected work was reported from January 1st to July 1st as amounting to over $340,000,000. This large figure is an indication that the rate of activity which prevailed before July 1st is likely to continue throughout the year.

Statistics of building and engineering operations in New England show that contracts awarded from January 1st to July 8, 1890 amounted to $188,622,000 as against $89,866,000 for a corresponding period in 1919 and $76,328,000 in 1918.



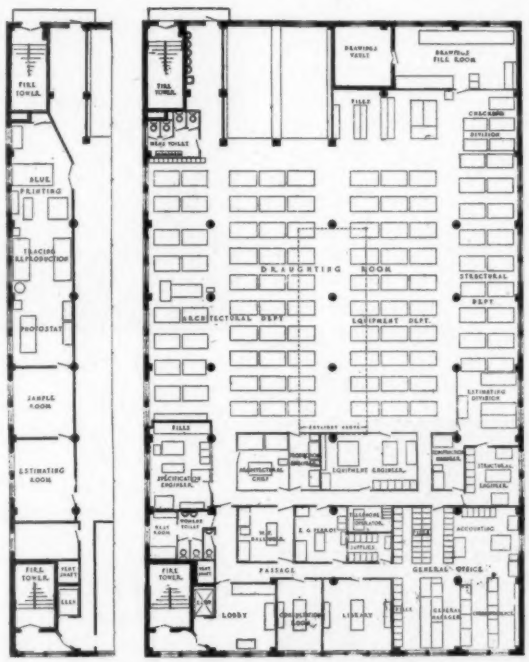
The Office of an Architect and Engineer

By EMILE G. PERROT

IN connection with the article entitled "The Balance," which appeared in the May 19 issue of THE AMERICAN ARCHITECT, and which very ably portrayed the balance that should exist between architect and engineer, it is interesting to note that many organizations have, under the stress of necessity, solved this problem by combining the services of architect and engineer in a single organization.

The concern with which the writer is connected has been performing its work in this balanced fashion for the past twenty years. One purpose only controlled the laying out of their present offices, namely, the creation of an efficient workshop where client, architect, engineer and contractor could all labor fruitfully and satisfactorily together.

The needs of this particular office are to some extent unusual, since the firm has a clientele whose requirements embrace a wide diversity of work. Thus a portion of the activities of our organization covers institutions, churches and schools; another phase brings us in contact with business buildings and industrial plants, while a third, related to both the above and yet different from either, directs our energies towards industrial housing and town planning. In all three fields, the architectural, the engineering and the equipment features are handled and developed *simultaneously*. This concern specializes also in mechanical work, such as process engineering, power plants, and similar developments.



ARCHITECTURAL OFFICES OF BALLINGER & PERROT, PHILADELPHIA, PA.

Such a variety of work necessitates the establishment of a workshop or office having ample provision for efficiently handling these several lines of endeavor, and so organized that work may be carried on simultaneously and independently if desired, while permitting work of two or more branches to be co-related whenever the advantage thereof is apparent.

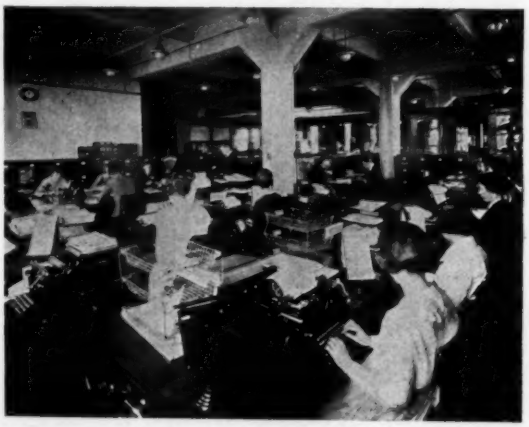
The offices here illustrated occupy the entire top floor of a building 90 by 150 ft. in area, receiving natural light on all four sides and in addition a large skylight furnishes daylight over the central portion. This floor is devoted to lobby, consulting room, library, general offices, private offices,

OFFICES OF HEADS OF DEPARTMENTS IN FOREGROUND

drafting room, file room, etc. On the floor below we occupy a row of offices, extending entirely across the north side of the building. A section of this space is devoted to a reproduction plant, wherein are blueprint machines, equipment for tracing reproductions and a photostat machine. Another section embraces sample rooms and contractor's estimating room, in which contractors who have not received plans and specifications, may leisurely and quietly take off quantities, preliminary to preparing their bids.

As will be noted from the floor plan of the top floor, the lobby, or reception room, the consulting room, the library, the contract and accounting departments, with general manager's office, stretch across the front of the building. These rooms have opaque partitions and are to all intents and purposes, soundproof. Next, in a commanding position, are the private offices of the firm. These offices are enclosed in light glass partitions which are translucent to a point about five feet above the floor, providing complete seclusion to the occupants when seated, and yet, permitting them, when standing, to view almost the entire organization at a glance. In this row is also located the telephone switchboard, which is elevated to permit the operator to view the entire floor and readily locate any person wanted no matter how far he may have wandered from his individual telephone.

Next comes the row of executives, or heads of departments, with offices enclosed only by railings sufficiently low so that they do not obstruct the view from the private offices just mentioned. In this are the chief architect, production engineer, chief mechanical engineer, and construction manager with their assistants. On one end of this row, separated by a small aisle is a glass partition, housing the chief specification engineer, with his heaps of samples and manufacturers' catalogs; while situated on the other end is the chief structural



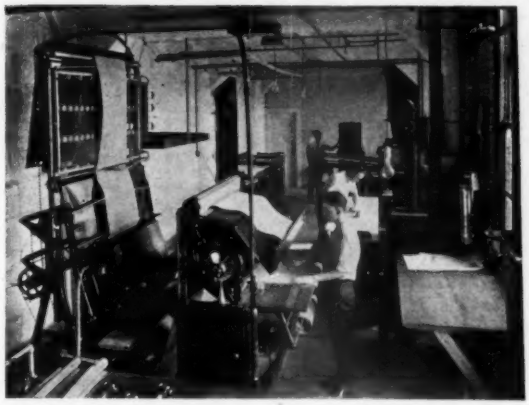
GENERAL OFFICE, CORRESPONDENCE, ETC.

engineer, with the estimating division immediately adjacent. From here, on back to the rear of the building are the drafting tables, arranged so that the forces of each department are in line with the office of their department head.

At the extreme rear an enclosed filing room is located. This consists of a large open space with wire partition, through an aperture of which drawings are handed out to those authorized to receive them. Here is also contained a fireproof vault in which are stored the record drawings of completed work.

When the work of any particular project is well under way, five or six tracing reproductions of the main outline of the particular structure are made and a complete set given each department. This not only saves time and expense, but each department has a set of drawings which are exact dupli-

PORTION OF DRAUGHTING ROOM



BLUE PRINTING DEPARTMENT

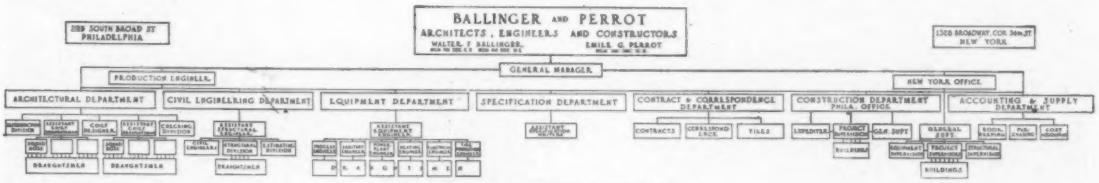
cates of sets given to other departments, being identical as to scale and detail. In carrying forward the work after it leaves the conference with client, there are frequent conferences between the executives of different departments, as well as between the squad bosses in command of the various groups of draftsmen.

The several features of any structure, including the architectural treatment, the engineering and equipment details, are carried forward together, with the result that when the final drawings are made, all these various features have, as it were, been built into the drawings, producing a complete, harmonious and unified structure, a culmination not always possible where the architectural work is first completed, and then the equipment and engineering provided from sources outside the architects office, which latter method, from the very nature of things, must subordinate such features and make them mere additions to the architectural drawings.

This firm has found through long experience that its clients' interests as well as its own have been best conserved by having all branches of architecture and engineering necessary for the proper and complete designing of structures, under one roof, and also under one governing, responsible head.

The illustrations portray better than a detailed description can, the complete *balance* existing between the various departments and the ease with which the department heads can co-operate. The fact that they are all located on one floor with an unobstructed view of each other and their respective subordinates, reduces to a minimum, the time generally consumed in a useless hunt for an individual who may not be free just at the moment wanted.

Efficient business methods are as essential to the practice of architecture as in any other business.



ORGANIZATION CHART

American Wooden Houses in France

Five hundred from an order of 1,000 wooden houses for the devastated regions of northern France have been delivered by a New York firm this spring. These houses are 7 meters or about 23 feet square and have three rooms and a shed. They are delivered in sections and complete, according to the Review of the American Chamber of Commerce in France, including windows, doors, glass, paint, nails, bolts, all ready for erection. Their erection is under the director of one of the French building departments. About a hundred of these houses are being erected in the Arras and Lens districts.

Data on Chimney Construction

The National Board of Fire Underwriters has issued an illustrated 12-page pamphlet entitled "An Ordinance for Construction of Chimneys." It is so drawn as to be suitable for use in cities and towns of any size, and is also suitable for individual use as a safe guide for the construction of chimneys intended for moderate temperatures.

Due to the large number of fires whose origin can be traced to defective chimneys, it is to be hoped that the recommendations contained in this pamphlet will receive careful attention and the principles laid down be put into practice more extensively than in the past.

Report on Trip to Princeton, College of City of New York, Yale and Harvard for the Purpose of Inspecting the Stadia at those Universities

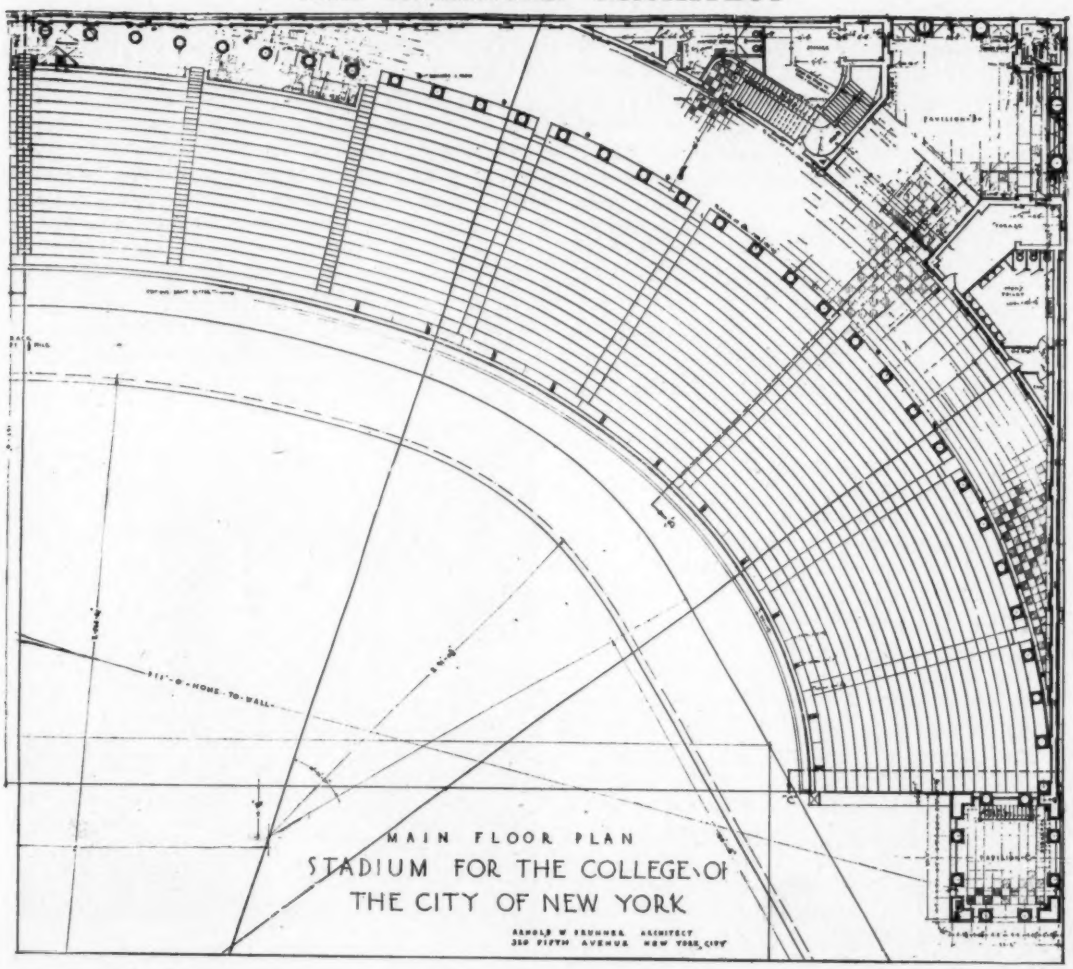
By HOWARD DWIGHT SMITH

Part II

AFTER observing the Palmer Stadium at Princeton and going immediately on to the one given to the College of the City of New York by Mr. Adolph Lewisohn one is impressed by the similarity in color. The tannish color noticed at Princeton is quite predominant at the City College. In size and in the shape of its inside curve, the City College Stadium is quite similar to the closed flattened end of the Princeton structure. It is in reality a sort of "hemi-stadium," its internal plan being half of an ellipse which has been bisected along its major axis.

Its seating capacity is 7,000, and the space which it encloses on one side is barely large enough for a football field. The running track is less than a quarter of a mile and a long straightaway is impossible. The structure is placed between two city streets (135th and 136th streets) and abutts on a third (Amsterdam avenue). The exterior of the structure on each of these three streets consists of a solid wall with entrances at the street intersections. On the interior the upper line of the semi-ellipse, at the top of the rows of seats, is marked by a simple Doric colonnade which terminates at each end in sturdy square towers. The placing of this colonnade gives an interesting and dignified appearance to the structure and because of the close spacing of the columns, the irregularities of the triangular spaces at each of the corner entrances are successfully masked. The great number of columns gives "scale" or an appearance of comparatively great size to the structure.

STADIUM FOR THE COLLEGE OF THE CITY OF NEW YORK
ARNOLD W. BRUNNER, *ARCHITECT*



The problem of handling crowds is not great. Entrance and exit is only by way of the openings at the street corners. No provision is made for egress from the seats to the field except by small stairways in the end towers. The wall at the inner line is 7½ feet high, the lowest aisle level being 5 feet above the playing field. All seat drainage is into this lower aisle and thence down into a cement gutter along the wall at the playing field level.

In the towers at each end of the Stadium there are showers and dressing rooms, and the stairs mentioned above. The dressing rooms and showers are quite extensively used, even though the gymnasium of the College is just across 136th street. The rise and width of the seats at City College is uniformly 16 to 28 inches which give a very satisfactory sight line.

After having been impressed with the apparent insufficiency of expansion joints at Princeton, careful observation of those at the City College stadium seemed important. It was founde that the Stadium had been built in sections with expansion joints located about 30 or 40 feet apart, around the ellipse and with a joint at the top row of seats along the flat archway or promenade at the upper entrance level. These expansion joints are of the overlapping or slip joint type in which lead plates and mastic cement have been used. The efficacy of these joints is testified to by the fact that after five years of contraction and expansion there is practically no unsightly cracking from temperature stresses or unequal settlement, except at a few points where the parapets of the four upper observation boxes overlap the expansion joints. There is a very definite lesson to be learned from this condition, and that is that extension joints should be absolutely continuous throughout the structure, that they should be designed to be a part of the architectural embellishments as well as of the structural necessities.

The expansion joints between the seat sections occur at one side of each aisle of steps. In prin-

ciple this appears to be a satisfactory solution. Inspection of the drawings and diagrams published in the Engineering Record of January 1, 1916 (Vol. 73, No. 1, pages 10, 12), shows that it was intended that the steps in these aisles should be so located as to have the riser of each alternate step line up with the riser of the adjoining seat. This of course would have led to difficulties with the expansion joint for the face of the joint would have been exposed for a few inches at each seat riser. This evidently has been overcome by moving the face of the step risers in order to keep the expansion covered by the overlap of the seat riser. In some cases this overlap hardly appears to be quite sufficient and some slight cracking has resulted.

The expansion joints in the floor of the promenade area at the top of the seats are covered with metal floor plates which are about 4 inches wide, secured to one section and allowed to slide over the edge of the other. This appears to be quite effective. In the vertical walls along the three adjoining streets the expansion joints have been covered by sheet copper plates. These plates not only cover the joints on the flat surfaces but have been formed to fit the profiles of the classic cornices and mouldings. The fineness of some of these mouldings has made it somewhat difficult to maintain proper contact and profiles. The lesson which is drawn from this is that (1) joints through moulded members should be plain, butt joints which should be free to open and close as necessary (with proper protection on top horizontal surfaces exposed to the weather); or, (2) that moulded courses should be designed to avoid expansion joints; or, (3) omit moulded courses, except of the most simple nature. (For structural and technical details refer to Engineering Record mentioned above).

For additional illustrations see THE AMERICAN ARCHITECT, Aug. 4, 1915.

It is realized that the problems of designing and erecting monolithic structures of reinforced concrete are not confined to stadia. Many buildings and engineering structures are being erected to-day where the problems of structural design involved are the same as or similar to those of a Stadium. Several large bridges recently built are recommended for further study.

The United States Army Supply Base at Brooklyn completed in August, 1918, consists of a group of five buildings, all built hurriedly and as a war emergency. Speed and economy of construction were prime considerations. Pretentious design is not aimed at, but the care with which the various structural members have been spaced and proportioned is sufficient indication that the fundamental principles of design can be applied to apparently so crude a material as concrete. The emphasis of vertical lines, the suppression of the heavy horizontal lines at each floor level, the logical location of solid towers, and the frank expression of material, shown by the form marks which have in general been left untouched, mark this factory-like group of buildings as a very interesting and successful example of reinforced concrete construction.

The two large warehouses dominate this group. One is 200 feet wide, the other is 300 feet wide. Each is 980 feet long and eight stories high. To take up expansion and contraction in such large masses, each building has been divided into four parts by three continuous transverse expansion joints. The joints in the side walls are sliding

NORTHEAST PAVILION

joints filled with mastic. The joints in the floor slabs are covered with steel sliding plates. The joints in the roof are made weather proof by flexible "V" shaped copper plates. In principle all of these forms of joints just mentioned are satisfactory. However, Major H. L. Green (U. S. Q. C.) now Utilities Officer at the Supply Base, says:

"The expansion joints run all the way through the building from roof to foundation. Foundations, however, are not divided. Experience has shown that the placing of these expansion joints is not quite sufficient as there have been evidences that tend to show the area of the sections, 250 feet by 200 feet is too great and that under the changes of temperature, stresses are discovered which result in cracks."

Time alone will tell how these buildings will wear and the evidence of good workmanship and material even in spite of the roughness of surfaces due to the presence of form marks, is apparent from an inspection of the structures at the Supply Base.

Quantity Survey System Receives Further Endorsement

Engineering Council Takes Action on Report of Its Committee

IN October 1919 the American Institute of Architects, Engineering Council and the Associated General Contractors of America each appointed three conferees, which formed a joint committee to discuss the matter of payment for estimating with a view to agreeing upon certain recommendations to be submitted to their respective organizations for action. At a meeting of this joint committee, held February 16, 1920, the following resolutions were adopted:

WHEREAS, there is great economic waste in the present usual methods of individual estimating of the same quantities by several different bidders on the same project; therefore, be it

Resolved, That the following are the conclusions of this conference:

(1) That any system of duplication of effort in estimating wherein each bidder separately estimates the quantities should be condemned.

(2) That all competitive bids should be based upon a detailed schedule of quantities prepared from a survey of the plans and specifications and submitted therewith, the cost of the preparation of such survey of quantities to be borne by the owner.

(3) That while the owner should furnish a quantity survey as the basis of bids and contracts, and should submit them with the plans and specifications, and should pay for the same, the bidders should make no charge to the owner for submitting proposals, based on said plans, specifications and quantity survey.

(4) That in general, competitive bids should not be invited nor submitted on projects, the plans and specifications for which are not accompanied by a quantity survey, unless the owner agrees to pay a predetermined fee to each bidder for preparing the quantities and submitting an estimate.

On the following day, Henry K. Holsman, president of the Illinois Chapter, A. I. A., and a member of the joint committee, addressed the National Conference on Construction of the Associated General Contractors of America on the "Expense of Estimating." This address was printed in full in the April 14th issue of the AMERICAN ARCHITECT.

During this conference, the Associated General Contractors adopted the following resolution:

Resolved, That the progress report of the joint conference of the American Institute of Architects, Engineering Council and the Associated General Contractors, on payment for estimating construction work as submitted to the annual meeting by the Committee on Methods, be adopted.

Engineering Council appointed a special committee to consider the report of the joint conferees, and at a meeting held June 17, Engineering Council adopted the conclusion of its committee, which follows:

Whenever in the execution of work, competitive bids are asked for on detailed plans and specifications, those invited to bid should be provided with such an estimate of the quantities involved in the work as the surveys, plans and specifications permit to be made. The intent of this requirement is that a single estimate of quantities should be made by or for the engineer, architect, or other representative of the owner, so that each separate bidder will not be put to the expense of making up a separate schedule of estimates. This latter practice not only means a needless waste in the carrying on of contract work, but also discourages bidders and causes needless repeated handling of official plans and specifications in making up separate schedules of estimates.

Eight months have passed since the nine representatives of the various organizations were appointed to the joint committee and five months since these conferees set forth their recommendations. During this period, two of the organizations represented have endorsed the findings of this joint committee. At the convention of the American Institute of Architects, held in Washington last May, no action was taken on this matter, and to date it is not known whether the report of the conferees has the approval of the Institute or not. In the meantime, it is interesting to note that the Philadelphia Chapter has gone on record as endorsing the recommendations of the joint conference, and it would seem likely that other chapters will give similar individual indorsement.

This is a matter of vital interest to the practising architect, and it is to be hoped that action will shortly be taken by the Executive Committee of the Institute removing all uncertainty, if indeed any can exist, as to the attitude of that organization toward a plan that makes for convenience, a reduction in the labor of estimating, greater accuracy, truer competition in bidding, and as an inevitable result of these attributes—economy.

XUM

Senate Committee to Consider Crises

National Federation of Construction Industries to Aid in Presenting Accurate Data

THE presidents and secretaries of the fifty odd associations affiliated with the National Federation of Construction Industries, met at the Union League Club, Philadelphia, June 17, to arrange for the preparation of statements to be submitted to the United States Senate Special Committee on Reconstruction and Production, which has recently been appointed and is particularly charged with the fostering and stimulating of construction work of all kinds.

There is a growing feeling of confidence in the work of this Senate Committee among those engaged in the construction industry, those dealing in real estate, as well as among housing and labor experts, for the reason that the chairman of the committee, Senator William M. Calder, of New York, is not only a practical builder, but has a thorough knowledge of the economic conditions surrounding the industry, as well as of the national problems with which the industry must synchronize. The personnel of the Senate Committee is as follows: Hon. William M. Calder, of New York, Chairman; Hon. William S. Kenyon, of Iowa; Hon. Walter E. Edge, of New York; Hon. Josiah O. Wolcott, of Delaware; and Hon. Edward J. Gay, of Louisiana. It is understood that the research work of the Senate Committee is being very carefully organized in advance and is in charge of Mr. Franklin T. Miller, who is a recognized authority on the economics of the construction industry.

The National Federation of Construction Industries represents, as a clearing house of information and action on the major problems of the whole industry, several hundred national and local associations engaged in the manufacture and assembly of construction materials. It is the purpose of the Federation to place before the Senate Committee exact information from each of its component associations. This information will be obtained by each of these associations from the thousands of concerns who are its own individual members and who are familiar with local conditions in every section of the country.

It is the hope of the Federation and of its affiliated bodies to thus briefly and clearly indicate to the Senate Committee the existing situation in each of the building trades, so called, to compare the potential capacity of each with the present quantity of its output, to compare the prices of the products of each with the prices of general commodities, and to draw the attention of the Senate Committee to the great influence of the factor of uncertainty which is now so seriously affecting costs and quantity of production, as well as making for uncertainty of delivery and speculation as to future delivery.

It is believed by many that this item of uncertainty is one of the largest items entering into the cost of construction at the present time. The labor factor is hardly more uncertain than the transportation or the financial factor. The cost of the raw material used in construction is, in itself, a very small item; it is the repeated application to the raw material of overhead, labor, transportation charges together with the speculation due to uncertainty of delivery which make up the final price to the consumer.

It is very evident that the construction industry can not function at all without capital, transportation, fuel and labor. It is equally evident that the greater the supply of these necessary elements, the more speedy will be the completion and the less the costs and the lower the rentals.

The full effect of the order of June 2nd, issued by the American Railroad Association, which gave preference to the shipment of coal, has not yet been fully realized. It is believed by many that this has placed a practical embargo on the movement of building materials and will bring about speculation in materials already available.

Freight rates, which in June 1918, were increased on the average of 25 per cent on general commodities, were, it is estimated, increased 50 per cent on some important building materials and now there is a prospect of a further increase. The ultimate cost to the consumer through increased freight rates and the uncertainty of the transportation are grasped with difficulty. In Chicago, sand is now costing from $4 to $5 a yard, and Chicago is built on sand dunes.

A statement of the actual conditions presented in an orderly fashion by the entire construction industry, by the financial, transportation, groups and by labor and housing experts, will go far to clarify the situation and encourage individual initiative, and at least decrease one of the largest items of expense—the item of uncertainty.

It is the hope of the optimists of the construction industry that the present necessity may greatly advance the standardization of materials used in construction, so that costs may be reduced through quantity of production and speedy assembly. After all Necessity is the Mother of Invention, and the construction industry is just commencing to learn what it can accomplish through standardization.